ECHNOLOGY DEPT.

The Chemical Age

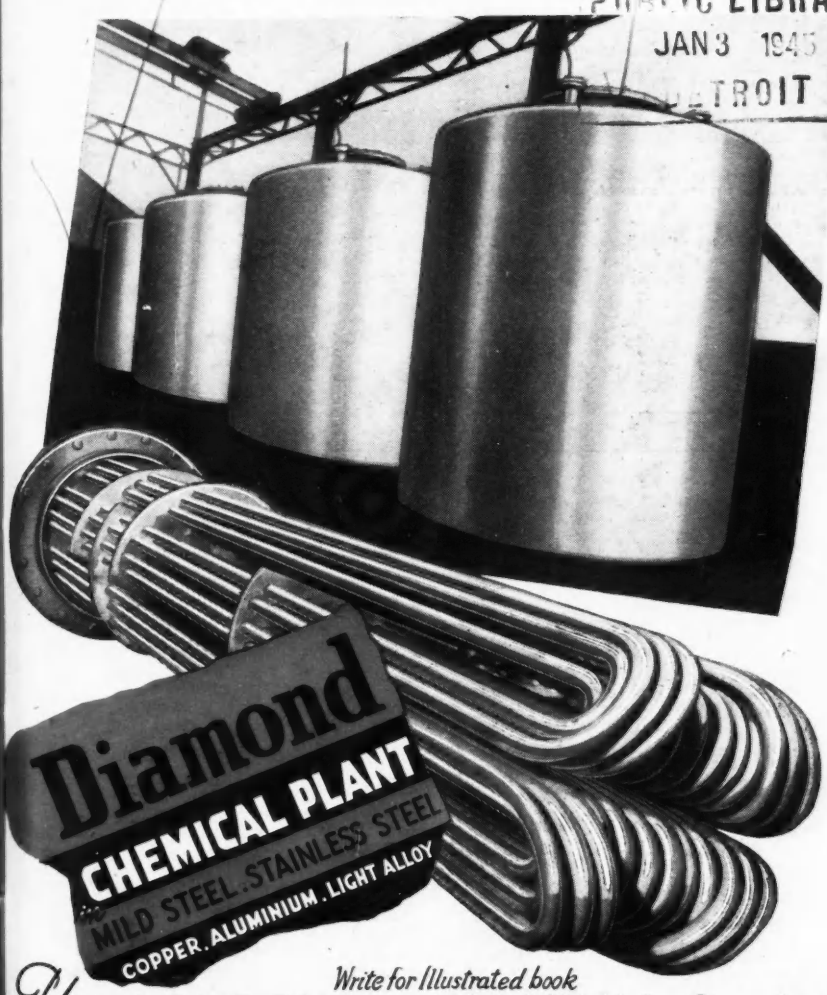
A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
No. 1329

SATURDAY, DECEMBER 16, 1944
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

PUBLIC LIBRARY
JAN 3 1945
DETROIT



Write for Illustrated book

The LONDON ALUMINIUM Co LTD.

WESTWOOD RD WITTON BIRMINGHAM 6

WELLS OIL FILTERS

gives OLD OIL NEW LIFE

With Wells' Waste-Oil Filter you can use your oil several times over and change it more often. A thoroughly reliable supply of oil is assured with the use of Wells' Special Filter Pads which work in conjunction with Wells' Patent Syphon Feed.

A.C. WELLS & CO. LTD
PROVIDENCE MILLS · HYDE · CHESHIRE

Write for fuller particulars of these oil filters. *Telephone: Hyde 953. Telegrams: Unbreakable Hyde.*

BAKELAQUE PHENOLIC RESINS

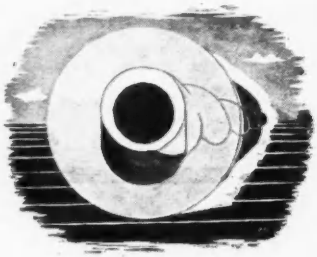
- for acid-proof coatings
- for abrasive wheels
- for electrical insulation

ATTWATER & SONS, Ltd.
Est. 1868
HOPWOOD STREET MILL, PRESTON, ENG.

MONO *pumps*

resist abrasion

The unique rolling motion between rotor and stator results in extraordinary resistance to wear. The standard rubber stator and hardened metal rotor form an ideal combination of abrasion-resisting materials and are perfectly lubricated by the water or other liquid being pumped. Abrasion resistance and ability to handle solids without damage are inherent qualities — you can't have a MONO Pump without them.



It's a matter of design.

MONO PUMPS LIMITED
ARNFIELD WORKS, AUDENSHAW, MANCHESTER. Telephone : ASHTON-UNDER-LYNE 3031
LONDON OFFICE : GRANITE HOUSE, CANNON STREET, LONDON, E.C.4. Telephone : Mansion House 6101

dm1135

BAMAG
ACID PRODUCTION CONCENTRATION AND RECOVERY PLANTS

For quality and capacity unequalled by other units of comparable size

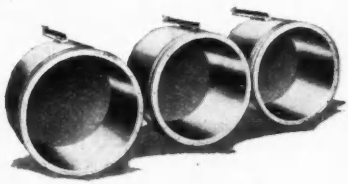
BAMAG

BAMAG LIMITED, UNIVERSAL HOUSE
60, BUCKINGHAM PALACE ROAD, LONDON, S.W.1
ON WAR OFFICE AND ADMIRALTY LISTS - Telephone : SLOANE 9282 (8 lines)

B25a

TANKS & VESSELS

Stainless Steel
Aluminium
and other
Weldable Metals



MIXERS
PANS
Receivers
Dryers, etc.

London Office :
149-151, Abbey House
Victoria Street, S.W.1

Robert Jenkins & Co. LTD
IVANHOE WORKS ROTHERHAM
Estd. 1856

Also at
MANCHESTER
and CARDIFF

A

Safety First

FOR SECURITY REASONS

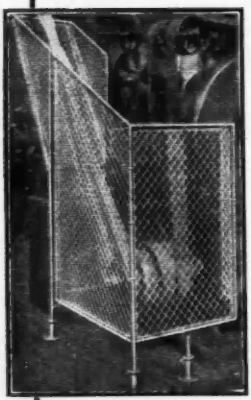
install

FOAMITE FIRE EQUIPMENT

FOAMITE LTD.
LANGLEY
BUCKS.

Telephone : LANGLEY 291/2 *Telegrams :* FOAMITE, SLOUGH

POTTER'S
Machinery Guards



● DESIGNED FOR SAFETY

● BUILT FOR SERVICE

Potter's guards are installed in works throughout the country and are distinguishable by their sound construction, good fitting and many exclusive features.

F. W. POTTER & SOAR LTD.
PHIPP STREET, LONDON, E.C.2
Telephones : Bishopsgate 2177 (3 lines)

"EVERTRUSTY"

Industrial SAFETY EQUIPMENT

ACID & ALKALI RESISTING **CLOTHING**, CARBOY **SAFETY DEVICES**, RUBBER, ASBESTOS, LEATHER & COTTON **GLOVES**, SPLASHPROOF **GOGGLES** AND **FACE SHIELDS**, and everything for the protection of the Industrial Worker.

Write to-day for a copy of our "Blue Book for Safety Appliances"—the result of fifty years' experience in protecting industry.

WALLACH BROS. LTD.
49 TABERNACLE ST · LONDON · E.C.2
CLErkenwell 1448/9

Safety First

INDUSTRIAL DERMATITIS

accounts for the majority of the cases of industrial disease occurring in the factories annually and these can be prevented (*Min. Lab. & Nat. Serv.*)

TO AVOID WASTAGE OF LABOUR IS A NATIONAL DUTY

ROZALEX

is the barrier substance for the prevention of dermatitis and has given satisfaction to thousands of firms for many years.

There is a grade for every trade

ROZALEX LIMITED 10 NORFOLK STREET MANCHESTER 2

SAFETY FIRST

THE "OLDBURY" PATENT CARBOY DISCHARGER

will empty and elevate up to 50 feet the contents of any carboy, bottle or vessel, and complies with all the conditions of the Factory Act of 1937.

KESTNER EVAPORATOR & ENGINEERING CO., LTD.

5, Grosvenor Gardens, Westminster, London, S.W.

Telephone: Terminus 2030

The mark of precision and efficiency

BB

Telegraphic Address: "Gasthermo," Smith, London.

BRITISH MADE THROUGHOUT

If you use heat—it pays to measure it accurately

B. BLACK & SON, LTD.

1, Green Terrace, Rosebery Avenue, London, E.C.1

Thermometer Manufacturers (Mercury in Glass Type)

Of all the principal Scientific Instrument and Laboratory Apparatus Manufacturers.

RUBBER FRICTION SURFACE BELTING & ENDLESS VEE ROPES

of

Superlative Quality

Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.

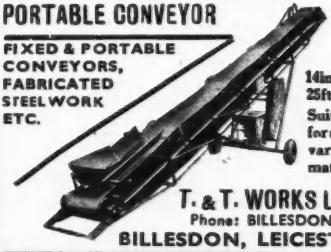
BURSLEM - Stoke-on-Trent

'Phone Stoke-on-Trent 7181.

'Grams: Belting, Burslem

THE "TEANTEE" STANDARD PORTABLE CONVEYOR

FIXED & PORTABLE CONVEYORS, FABRICATED STEELWORK ETC.



14in. belt 25ft. crs. Suitable for a wide variety of materials

T. & T. WORKS LTD

Phone: BILLESDON 261

BILLESDON, LEICESTER

THE HEART OF ENGLAND IS THE HOME OF **LIMESTONE**

LIMESTONE

of the highest chemical purity for all

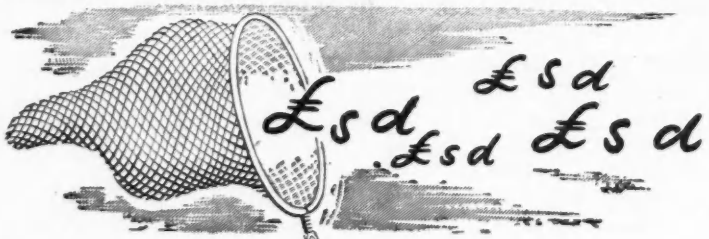
CHEMICAL AND INDUSTRIAL PURPOSES

LUMP · CRUSHED · POWDER

The geographical distribution of our many quarries ensures efficient delivery service over a wide area at economical rates.

DERBYSHIRE STONE LTD

BANK HOUSE, THE BRIDGE, MATLOCK *Telephone Matlock 396*



There's money in the air

Wherever solvents are used money literally takes to the air as the result of evaporation and in many industrial plants this wastage can be very serious. There isn't the space here to list all the industries which can benefit from solvent recovery but, if you use solvents at all, and are in any doubt whether an active carbon recovery plant would be a worth-while proposition, our advisory department can clear the air by supplying you with the necessary details.

SUTCLIFFE, SPEAKMAN
AND COMPANY LTD · LEIGH, LANCASHIRE
London Office: 66 Victoria Street, S.W.1
Tel.: VIC. 7982-3.

Melbourne Agents—Messrs. H. R. Hill & Son, Pty, Ltd., 350 King Street.

CHEMICAL PLANT

Newton Chambers specialise in the design and manufacture of all types of plant for application to the Chemical Industries.

Expert advice is always at your disposal.

ILLUSTRATIONS.

TOP RIGHT. Jacketed Paddle Mixer.

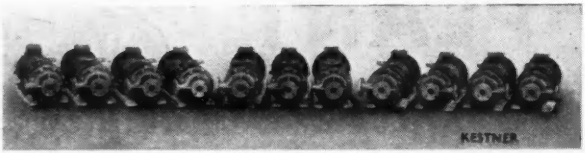
CENTRE. Retorts in Heat-Resisting Cast Iron.

LOWER LEFT. Sulphur Burner.

NEWTON CHAMBERS

NEWTON CHAMBERS & CO LTD THORNCLIFFE NR SHEFFIELD

A NEW ACID PUMP
GLANDLESS—SELF-PRIMING



PATENT GLANDLESS ACID PUMPS

- NO PACKING GLAND
- NO BEARING SURFACE IN CONTACT WITH ACID
- MADE IN SPECIAL MATERIALS RESISTANT TO ALL CORROSIVE LIQUIDS
- LONG AND TROUBLE-FREE LIFE ASSURED
- SELF-STARTING EVEN AFTER A LONG SHUT-DOWN.

Full Particulars from:

KESTNER EVAPORATOR & ENGINEERING CO., LTD.

Chemical Engineers 5, GROSVENOR GARDENS, LONDON, S.W.1

A Monument to Quality

Brilliant filtrates from all types of chemical liquids produced through the Metafilter are a monument to the high-quality filtration which it ensures. In addition to chemical liquids, the Metafilter handles with equal facility and success synthetic drugs, biochemical products, gelatine, syrups, and extracts; and it withstands the action of acids, alkalis, oils, and organic liquids.

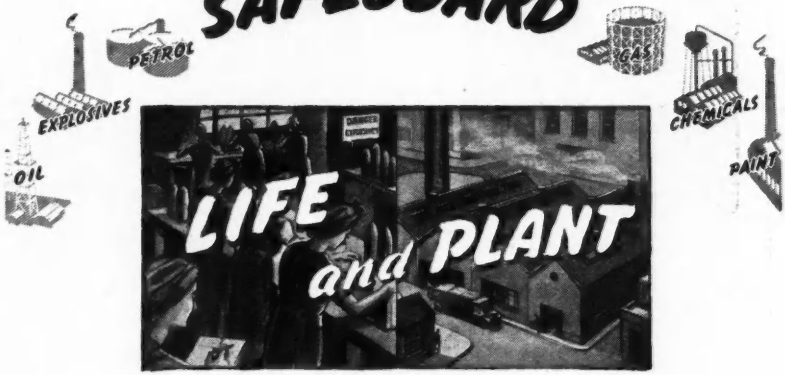
Metafiltration

THE METAFILTRATION CO. LTD., BELGRAVE ROAD, HOUNSLOW, MIDDLESEX.

Telephone: Hounslow 1121/2/3 Telegrams: Metafilter, Hounslow.

IN HAZARDOUS INDUSTRIES...

SAFEGUARD



IN many key industries tool sparks are a deadly threat to vital production. For, remember, the striking of a spark by a steel tool in the presence of explosive or inflammable products can easily cause a disastrous fire or explosion. A sure safeguard against this danger to life and plant is to provide TELCON SAFETY TOOLS. Made from Beryllium-Copper—a non-ferrous alloy of exceptional strength and hardness—they will stand up to the severest conditions of service without the risks of dangerous sparking. All types of hand tools available. Special tools made to order. Write for details.

For Safety's sake-instal

TELCON

Beryllium Copper Non-Sparking

SAFETY TOOLS

Manufactured by

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD.

Head Office : 22 OLD BROAD STREET, LONDON, E.C.2. *Tel. :* LONdon Wall 3141

Sole Distributors : BERYLLIUM & COPPER ALLOYS LTD., 39 Victoria Street, London, S.W.1 *Tel. :* ABBey 6259

Fine CHEMICALS FOR EVERY PURPOSE

Industry's New Suit

Soon our vital British Industries, first in the call to arms, must switch to the re-construction of stricken Europe. In the resurgence of peaceful production, new Industries, too, will arise within the framework of the old. Swords to ploughshares, in very truth. New materials, each with an unique function, will meet the needs of what economists call the "consumer-goods market." May & Baker, with their research group of Chemists, who have won lustre and fame throughout the war years, maintain a leadership in the production of *Fine* Chemicals which they have held since the 18th Century, and which affirms Dagenham as a centre of the Fine Chemicals Industry. Information which is constantly arising from the discovery of chemicals for new purposes, and which will help to meet the needs of industries yet to see the light of day, will be handed on for the benefit of our customers. M & B Industrial Chemicals and Drugs are rigidly standardised for quality before release, by our Control Laboratories. May & Baker's Sales Division will gladly co-operate in the solution of your post-war chemical problems, and reply to all enquiries. Tel. : Ilford 3060 Ext. : 71 and 72.

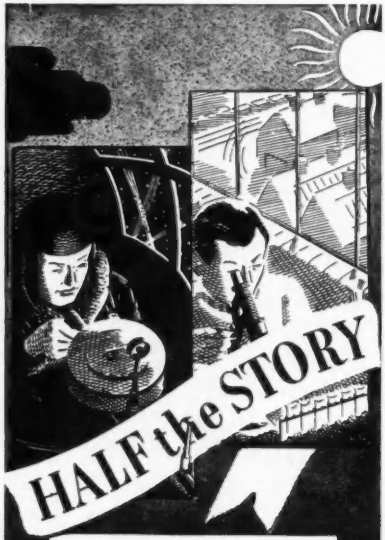
May & Baker Ltd

DAGENHAM

LONDON ENGLAND

PLANET BRAND

M & B Industrial Chemicals Series No. 1a.



AT the moment only half the story can be told. Not until the peace has been won can we tell you of the war developments which will be incorporated in the post-war design and manufacture of our Optical-Mechanical-Electrical Instruments and Aircraft Equipment.

AVIMO LTD., TAUNTON
Somerset (England)

Approved under Air Navigation Rules for Civil Aviation.

AVIMO

PROGRESS by QUALITY

A. J. RILEY & SON, LTD.

BATLEY, YORKS

Telegrams: " BOILERS, BATLEY." *Telephone:* 657 BATLEY (3 lines) ESTABLISHED 1888

Makers of

MILD STEEL RIVETED AND WELDED VESSELS

JACKETED PANS COMPLETE WITH AGITATORS

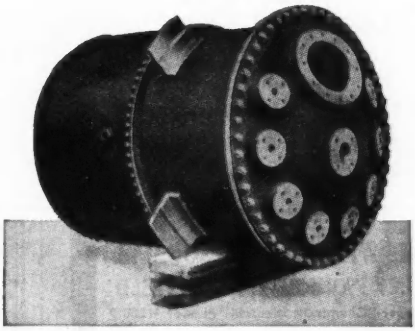
SHEET LEAD OR HOMOGENEOUS LINED VESSELS

TAR, BENZOLE & OIL STILLS

CONDENSERS, EVAPORATORS AND DISTILLING PLANTS

MILD STEEL PIPES ALL PRESSURES

LANCASHIRE, CORNISH ECONOMIC & W.T. BOILERS



PRECISION TURNED & SCREWED REPETITION WORK IN ALL METALS

ON AIR MINISTRY ADMIRALTY & WAR OFFICE LISTS

'PHONE: NOTTINGHAM 46068 (3 Lines)

'GRAMS: CAPSTAN, NOTTINGHAM

CASTLE ENGINEERING CO., (NOTTINGHAM) LTD.

HASLAM ST., CASTLE BOULEVARD, NOTTINGHAM

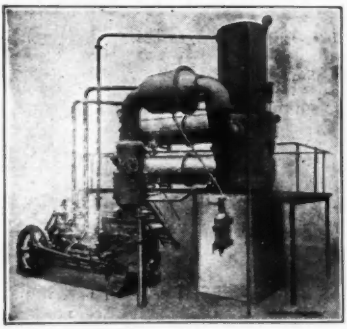
W HYDROFLUORIC ACID

AMMONIUM BIFLUORIDE
ACCUMULATOR ACID
SODIUM FLUORIDE
FLUORIDES

Also Specially Pure Hydrochloric, Nitric and Sulphuric
ACIDS FOR ANALYSIS

JAMES WILKINSON & SON, Ltd.
TINSLEY PARK ROAD, SHEFFIELD
Telegrams: "Chemicals, Sheffield" Phone: 41208-9

Mirrlees'
HORIZONTAL DOUBLE EFFECT CONCENTRATORS
for **Sensitive Liquids,**
e.g. **Gelatines, Extracts, Foods, etc.**



Liquid makes one rapid traverse of tubes.
Shortest exposure to heat
Easy cleaning. Steam economy

MIRRLEES WATSON COMPANY LIMITED
ENGINEERS GLASGOW

ACTIVATED ALUMINA

ADSORBENT AND CATALYST

BRITISH MANUFACTURE

WRITE FOR PARTICULARS

PETER SPENCE & SONS LTD.
NATIONAL BUILDINGS · ST. MARY'S PARSONAGE
MANCHESTER, 3
LONDON OFFICE: 4 HANGER GREEN, EALING W.5

TRADE B-O-S-S MARK
VALVES, OF ALL TYPES IN ALL METALS FOR ALL PRESSURES AND DUTIES

WE SPECIALISE IN ENGINEERS' REQUIREMENTS FOR THE CHEMICAL AND ALLIED TRADES.
STANDARD PRODUCTIONS FROM STOCKS AT:— LONDON, LIVERPOOL, LEICESTER, WHISTON, GLASGOW, BRISTOL, MANCHESTER & NEWCASTLE-ON-TYNE

BRITISH STEAM SPECIALTIES LTD
WHARF STREET, LEICESTER

A 6

BARBITONE
BARBITONE SOLUBLE
AND
ALLOBARBITONE

FINEST QUALITY.

ACTUALLY MANUFACTURED AT BARNET

by

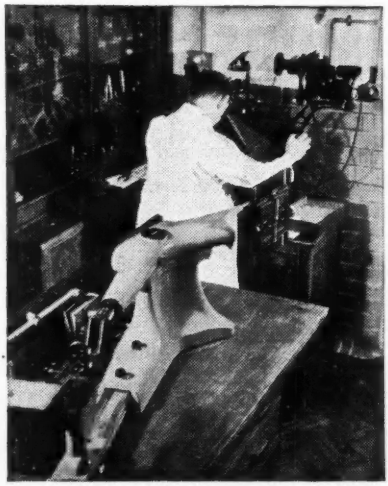
PIERSON, MORRELL & CO., LTD.

(THE ORIGINAL BRITISH ASPIRIN MAKERS)

QUEEN'S ROAD - BARNET - HERTS

Phone : Barnet 0723 Grams : Pierson, Morrell, Barnet

GENATOSAN LABORATORIES SPECIALISE IN RESEARCH ON



PURINES & PYRIMIDINES

The following are available on a plant production basis :

Uric acid, Alloxan, Alloxantin, Allantoin, Acid Sodium urate.

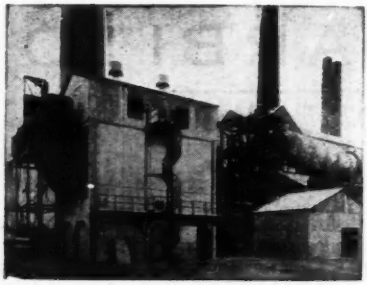
Limited small quantities of the following are available for research purposes :

Violuric acid, Uracil, Thiouracil, Dialuric acid, Triaminopyrimidine, Murexide.

Enquiries to **GENATOSAN LTD., LOUGHBOROUGH, LEICS.**

CLEAN GAS

LODGE COTTRELL
ELECTROFILTERS



FOR
COMPLETE
PRECIPITATION OF

CEMENT KILN DUST
TAR FOG & ACID MIST
BOILER FLUE DUST
PYRITES DUST
SMELTER FUMES
BLAST FURNACE DUST

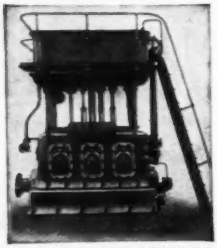
Head Office and Works:
BIRMINGHAM.

War-time Office for LONDON:
16, Church Street, Godalming Surrey.

LODGE-COTTRELL LIMITED
PIONEERS AND SPECIALISTS

HIGH AND LOW PRESSURE

AIR & GAS COMPRESSORS



5-STAGE COMPRESSOR
400 Atm.

For pressures up to 1,000 Atm. and capacity up to units absorbing 3,500 B.H.P.

Also
WATER COOLING PLANT, STEAM ENGINES AND TURBINES, OIL ENGINES, &c.

PETER BROTHERHOOD LTD.
PETERBOROUGH

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (10 lines
GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784 5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LI
No. 1329.

December 16, 1944

Annual Subscription 21s.
Overseas 26s.

Organising Works for Production

IT is a characteristic of every successful business to grow. In a manufacturing business growth means the addition of machinery or of process plants which are put down in any convenient place and are frequently found, when later additions are required, to be in the way. In this manner a works becomes an accumulation of plant and machinery, of workshops, store yards, power plant, and so forth, arranged wherever there happens to be room and without an organised plan. There are some works, by-product coke-oven plant being an example, which can be planned from the beginning. It is known that the process will be continuous and provision is made for the known maximum quantity of output. The whole of the plant is therefore designed to facilitate a flow of materials through the works so that labour, handling, and so forth are reduced to the minimum. When an extension is required, unless provision has been made for this when designing the plant, it generally means that a new plant has to be put down alongside.

This is the exception, however, and the great majority of British works are not designed in this way, but have grown up by the addition of quanta of machinery or plant in the manner already described. This is true of works built quite recently and it has been our lot to hear the complaints of many works managers regarding the difficulties of their site and of the layout of their plant, even though the works may only have been in operation for ten years or so.

This is a factor which must be considered carefully in any reconstruction programme. We were privileged to visit a meeting of the Institute of Welding recently at which the future of welding after the war was discussed. Many of those present at this meeting expressed the same opinion, namely that in competition with America our engineering works will suffer because they are not laid out for the production of plant by welding. Quite frequently a works which takes up welding does so first by way of repairs and and slowly proceeds from that stage to the stage of producing completely welded plant. Delays are very often the result, because of overmuch handling, and a good deal of unnecessary costs and lost time. The view was forcibly expressed that if we are to retain our position in the engineering world and particularly in regard

On Other Pages

Notes and Comments	558
Ardil	560
Thermal Methods for Hydrogen Production—II	561
Kazakhstan's Minerals	565
Nylon Recovery	565
Moth-Proofing Agents	565
Parliamentary Topics	566
Letter to the Editor: Scientific Textbooks	566
Personal Safety in Handling Chemicals—III	567
Industrial Safety Gleanings ...	569
New Control Orders	570
Personal Notes	570
British Petroleum	571
General News from Week to Week	571
Forthcoming Events	573
Company News	574
Stocks and Shares	574
British Chemical Prices	576

to welded vessels, it will be necessary to lay out engineering shops for welding. In order to do this it may be necessary to scrap entire works and to redesign for a regular flow of material through the works.

If this is true of the welding industry it is likely to be equally true in many other industries and probably not least in the chemical industry. The chemical industry is peculiarly one in which one type of manufacture after another is likely to be taken up, so that a works will tend to grow without any ordered plan. Industrial efficiency has been called for as a keystone of post-war reconstruction. Efficiency can be promoted by the lay-out of works, and we suggest that this matter should be given the closest attention by works managements. This problem of lay-out is not merely a matter of transport costs and of the quality of the work or of convenience; it is indissolubly bound up with productivity per man-day. Whether we shall see, after the war and after the years of immediate post-war construction are passed, an increase in the consumption of goods throughout the world, we cannot say. We maintain our belief, however, that by opening up countries which have hitherto possessed a low standard of living we may find for ourselves such new markets as will enable full advantage to be taken of mass production. This is apparently the view of the Government. The Minister of Fuel and Power, for example, has lately agreed in public that the price of coal is much too high and has maintained that the high prices must not be reduced by reducing wages, but by (a) increasing the efficiency of mining and (b) increasing the productivity per man.

It seems certain that unless we can attain the two goals laid down by the Minister of Fuel, we shall not be able to compete in the markets of the world. Much of the vast American war achievement in producing ships and munitions has been due to the design and lay-out of works in such a way as to take advantage of mass production. Our older and more conservative businesses in England must take that lesson to heart and must be prepared to spend money in order to put the lessons thus learnt into effect. There is little doubt that we have much leeway to make up.

A recent writer has said that, although after the last war British engineering industry was well equipped relatively, with the slump of 1921 the control passed largely into the hands of lawyers and accountants, whose only aim was to write down assets sufficiently to enable them to pay dividends. If the Government policy after this war avoids a slump; if those who can understand will cross the Atlantic to see what can be done in matters of design and production; and if the workers can see that greater production can easily mean greater comforts and a wider life, we should have a reasonably good chance of successful survival.

NOTES AND COMMENTS

Vacation Work

PLANS for co-ordinating scientific education with technological industry are being advocated in every quarter; but it is not only plans that are afoot. Some extremely valuable practical work in that direction has been, and is being, achieved. An idea of what is in the wind may be obtained from the tenth annual report of the Imperial College Union vacation work scheme for students of the College. The report covers the year ending October, 1944, and begins with a review of the conference of industrial representatives which was held last December and was duly reported in our columns. A later important meeting, held last June, was attended by a number of Apprentice Supervisors from typical firms; at this, definite recommendations were formulated for the planning of vacation work, and each of the 25 companies concerned has presented the I.C.U. with a tentative scheme showing how to provide the best experience for the students. Each student can now himself know in advance what course he will be following with the companies concerned (a list of whom is appended to the report). Other func-

tions of the Union, which cannot fail to aid in the co-ordination of education and industry, include visits to works, and special arrangements for all students of metallurgy to register for vacation work. The Welfare Department of the scheme has arranged for obtaining exemption for the students from the National Health and Unemployment Insurance Acts, as well as from P.A.Y.E. Income Tax during vacation work. Even a cursory glance at the list of firms who offered their co-operation in the scheme will show that the chemical industry has realised the importance of the work in hand.

Fetters for the "Small Man"

THERE may be something to be said for the thesis that the State should keep a watchful eye on the powerful business combine which can affect the comfort and happiness of many thousands of citizens; but there can be little justification for adding new difficulties to the mass of controls and restrictions already hampering the small businesses that are striving to prepare to make a living after the war. In a letter published in the *Daily Telegraph* recently, Sir Ernest Benn deals with the recent Treasury Order relating to new capital issues, as it affects the formation of companies with a capital of under £10,000. Already, he says, the small business is "subject to the paralysing uncertainty of control. One little liberty has, however, so far, been left to the citizen-tradesman who appreciates his responsibility for our post-war prosperity. He has been free to try to arrange his finance, if his plans were modest enough to come within a limit of £10,000. . . . Now, if you please, Treasury sanction must be obtained, however small the capital sum may be. The harassed official-ridden trader . . . may perchance obtain the promise of finance, only to fail to secure the Treasury sanction. Alternatively, he may secure the sanction, but not the money, but in practice is more likely to secure neither, for the lender cannot commit himself until sanction is obtained, and the Treasury, true to form, may refuse to consider the case until the money is assured. This inescapable dilemma is common to most controls. The new restriction has no bearing on the war effort, for the actual work or trade is already controlled in every detail. . . . This final turn of the Treasury screw in the wrong direction should be promptly reversed and repudiated."

Controlling German Industry

CONSIDERABLE interest has lately been shown in the United States in finding the best method to adopt for controlling German industry with a view to preventing the recurrence of the present state of affairs for a generation or so, at any rate. Mr. Secretary Morgenthau's plan for reducing Germany to the level of a purely agricultural state does not appear to have met with general approval, no doubt as being inimical to the resumption of trade. An alternative suggestion, mooted by the presidents of five engineering societies (Civil, Mining and Metallurgical, Mechanical, Electrical, and Chemical), proposes the control of Germany's synthetic oil, explosives, aircraft, light metal, high-alloy and electrolytic steel, and nitrogen fixation industries. Steps suggested include the complete elimination of synthetic oil; the reduction of synthetic nitrogen capacity by 75 per cent.; the reduction of steel-making capacity by 50 per cent. and the prohibition of the import of iron ore, flux material, steel, and steel products beyond normal peace requirements (whatever those may be); and the elimination of all aircraft plants and aluminium plants, with prohibition of bauxite imports. Another article suggests that the Anti-Trust Division of the Department of Justice, which has investigated the ramifications of German influence in American industry through the cartel system, is aiming at securing a dominant position in any committee to control post-war German industry. Some doubt is expressed whether the officials of the Anti-Trust Division are likely to handle the affairs of the German chemical industry, for example, more judiciously than could the officials of the chemical companies or the actual chemical technologists.

Formaldehyde consumption, estimated at 120 tons yearly, is on the upgrade in Sao Paulo, Brazil. Main users are the plastics, rubber and textile industries.

Ardil

A New British Synthetic Fibre

STARTING from ground-nuts as raw material, British chemists of I.C.I. have evolved a new synthetic fibre which is wool-like, does not shrink and is not attacked by moths. The material is known as Ardil from the fact that the idea was developed and the experimental work carried out at the I.C.I. works at Ardeer. Ardil was ready for development at the beginning of the war, but since then development work has been held up, and no samples are yet available for distribution to the textile trade.

Dr. R. E. Slade, controller of research to I.C.I., told a representative of THE CHEMICAL AGE, on Tuesday last, something of the development work that had gone into production of Ardil. As early as 1935, Snia Viscosa succeeded in producing a fibre—Lanital—from casein, partly as a result of the sanctions placed on Italian cheese exports at that time. This was in many ways unsatisfactory in its resistance to damp and heat, and in the same year Astbury and Chibnall began experiments on the production of fibres from vegetable proteins of the globular type. It was pointed out at the time, and since, that there are uses for milk protein more essential than the manufacture of textiles.

Chibnall's success in dissolving an extract of hempseed protein in a urea solution and producing a wool-like fibre induced I.C.I. to consider the possibility of commercial exploitation of vegetable proteins. Development had reached the scale of a large laboratory plant for the manufacture of textiles from ground-nut protein fibre when the outbreak of war suspended operations.

Methods of Production

Dr. D. Traill, who has been principally responsible for the development of Ardil, and who is giving technical details of its production, as we go to Press, at a meeting of the Royal Institute of Chemistry and the Society of Chemical Industry at Nottingham, enlarged further on the methods employed. The ground-nut, he said, was chosen as raw material for economic reasons, as well as on account of the nature of its protein. Ground-nuts grow in quantity in the British Empire—in India, in West, South, and East Africa—as well as in China and America. In 1938 the world crop was about 8 million tons, a figure that could easily be increased. One ton of nuts produces about 500 lb. of Ardil fibre.

The composition of the ground-nut is approximately: arachis oil, 48-50 per cent.; protein, up to 28 per cent.; carbohydrates, 11 per cent.; salts, water, etc., 8 per cent. The oil, which is extracted from the decorticated nuts by a low-temperature process, is used for human food (salad oil, margarine) and for high-grade soap. From the oil-free meal, containing 9 per cent. nitrogen, the protein is extracted by a carefully-controlled method employing dilute caustic soda, and the protein—Ardein—is then precipitated with acid. The residual meal, with 2 per cent. nitrogen, can be used as a cattle-feed. The spinning solution is obtained by dissolving the protein in caustic soda—careful control being again an essential—thus avoiding the high cost of the 35 per cent. urea solution used in the original experiments.

The solution is extruded through spinnerets in the usual manner, but a special method has been evolved for hardening the filaments. The traditional method with a formaldehyde bath had not proved satisfactory in the case of Lanital, owing to hydrolysis of the protein, and the method adopted consisted in lowering the *p*H of the bath in order to avoid hydrolysis. The fine filaments obtained can be cut into any required length according to their final purpose. They may be mixed with wool, cotton or rayon, and yarns may be made on the worsted, woollen or cotton systems according to the type of fibre required.

Properties of the Fibre

Ardil is a cream-coloured, crimped, resilient fibre which is soft and warm to the touch. It absorbs moisture like wool and has a similar heat of wetting. It possesses felting properties, not like wool and fur which have scales on their surfaces, but because it moulds under heat and pressure. Ardil dyes like wool, acid dye-baths being mainly employed, but is not attacked by moths.

Fabrics have been made purely of Ardil, but its best use is likely to be in combination with wool or rayon. Fabrics containing 50 per cent. Ardil are scarcely distinguishable from pure wool. It is expected that Ardil will be cheaper than wool and so reduce the price of such fabrics. It is emphasised that Ardil must not be considered as a substitute for wool; it is essentially a complementary fibre. Highly-attractive fabrics with the handle and appearance of wool have been made from Ardil and rayon, indicating a field in which great textile developments are possible. It is hoped that Government approval may soon be obtained to allow this new fibre to be developed in the British textile industry.

Thermal Methods for Hydrogen Production

II. Steam-Iron and Water Gas Systems

by D. D. HOWAT, B.Sc., Ph.D., F.R.I.C., A.M.I.Chem.E.

(*Continued from* THE CHEMICAL AGE, *December* 9, 1944, *p.* 543)

RADICAL modifications in the hydrogen generator system are suggested in the design patented by the Power Gas Corporation, Limited.[6] Most important of the proposals is to separate the chamber containing the ore mass from the superheater, so constituting two separate chambers. Reasons for this striking departure from previously accepted designs are: (1) It simplifies construction; (2) it prevents unduly high temperatures from developing on top of the ore mass with the possibility of sintering; (3) it allows more efficient combustion of the residual gases leaving the ore mass after reduction.

Fig. 4 shows a lay-out of a hydrogen generator embodying the separate generator and superheater chambers together with regeneraors for preheating the reducing gas before its introduction to the generator. In the conventional designs with superheater arranged immediately above the generator, the combustion arch was subjected to the highest temperatures, with resulting constructional troubles. In the new design the residual gases escaping from the top of the generator are fed to the top of the superheater and pass downwards through the chequer brickwork and thence to the stack. To ensure efficient combustion of the residual gases and turbulent flow of the hot gases through the chequer brickwork, the secondary air is admitted tangentially to the top of the superheater as shown in Fig. 4.

Provision is made for heating the reducing gas to a temperature above 550° C.—shown to be important in preventing carbon deposition in the ore mass[7]—by splitting the flow of the residual gases from the top of the generator. The larger fraction passes to the superheater; the smaller, flowing through a manifold, is burned by the admission of secondary air in one or other of a pair of identical regenerators filled with chequer brickwork. As the hot residual gases pass through one of the regenerators the reducing gases are flowing over the preheated chequer brickwork of the other before entering the generator. At regular intervals the flow of residual and

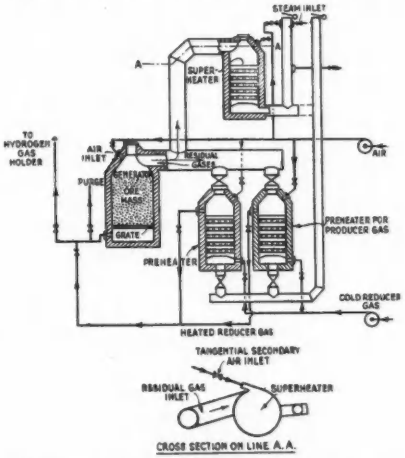


Fig. 4. Hydrogen production plant comprising separate generator and superheater and regenerators for preheating reducer gases (B.P. 548,398).

reducing gases is reversed, the temperature in the generator being maintained above 550° C. throughout the reducing phase.

Two interesting modifications of the steam iron-process have been patented by the W. M. Kellogg Co. of the United States of America. In one[8] the iron is prepared as a very fine powder (particles minus-20 to minus-200 mesh) which is mixed with the steam to form a gaseous suspension, a device known as an Air-veyor being suggested as suitable for the mixing of the steam and iron. The suspension of the fine iron particles in steam is then blown through tubes or reaction chambers heated to a temperature over 315° C. Escaping from the reaction chamber at a temperature of about

425° C., the oxidised iron particles are separated from the mixture of hydrogen and excess steam by a centrifugal device. Separation of the steam from the hydrogen and subsequent purification follow the normal procedure. From the centrifugal separator the oxidised iron particles are made into a suspension with a reducing gas, a mixture of carbon monoxide and hydrogen produced by catalytic decomposition of methane. Reduction of the oxidised iron particles takes place in tubes, the temperature being in the range 800-1100° C. The heat from the reduction stage is used to raise the temperature of the gaseous reaction mixture in the oxidation stage. The iron particles are separated from the reducing gas mixture in a centrifugal device, and are conveyed back to the oxidation stage. The residual gases from the reduction stage, still containing excess combustible constituents, are burned in a furnace, the heat liberated being employed to generate the necessary steam for reduction and to raise the temperature for the catalytic decomposition of the methane. One disadvantage of the process must lie in the tendency towards sintering of the oxidised iron particles.

Another modification[9] involves the reaction of the fine iron particles with liquid water, the pressure being maintained at a value greater than the vapour pressure of water at the operating temperature range 230-370° C. Claimed to be an improvement over the original method devised by Bergius, the process comprises two charging drums from which the iron particles are fed to four pressure reaction chambers as shown in Fig. 5. In starting up the process the charging drums are filled, hydrogen then being admitted through pressure tubes until the pressure has risen to the required value. When the necessary pressure has been attained the fine iron particles are fed to the reaction chambers already charged with preheated water. Hydrogen, generated by the reaction of the water on the iron, passes out from the chambers to a common manifold connected with the pressure tubes to equalise pressures throughout the system. Water and water-vapour are separated from the hydrogen which then passes to the holder. The separated water is circulated through a preheating furnace to raise it to the required temperature before being returned to the reaction chambers. From valves at the base of the reaction chambers the iron oxide flows out to pressure receiving drums and thence to a hopper. From the hopper the oxide is conveyed to a reduction furnace in which it is reduced to metal by contact with a mixture of carbon monoxide and hydrogen at a temperature of about 800° C. Superimposed inclined vibrating screens in the reduc-

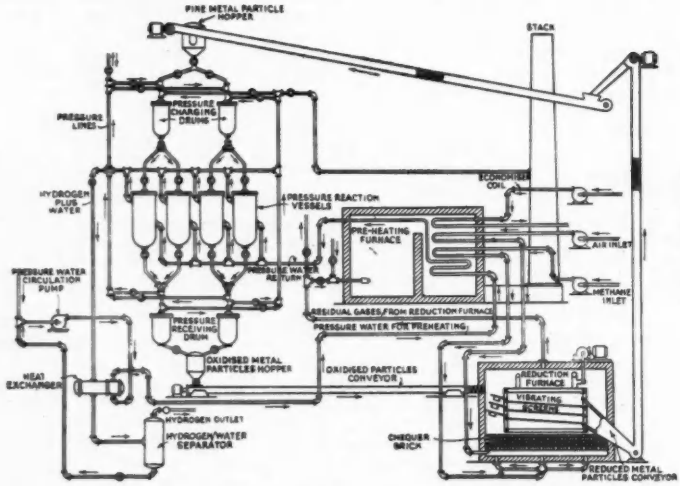


Fig. 5. Production of hydrogen by reaction of liquid water under pressure with fine metal particles (B.P. 547,243).

tion furnace expose the oxide to the reducing gases and convey it to the discharge, from which the reduced metal particles escape to a conveyor. By means of the conveyor the particles are returned to the charging drums.

The reduction gas mixture is made by catalytic decomposition of methane (although other reducing gases may be employed). From the blower fan the methane is circulated through tubes in the preheating furnace and thence to chequer brick arranged in the base of the reduction furnace, the chequer brick being impregnated with a suitable catalyst. The residual gases from the reduction furnace are burned in the preheating furnace, the heat being employed to preheat the water for the reaction chambers, to assist in the catalytic decomposition of methane, and to generate steam. Extraneous fuel may be used, if necessary, to maintain the required temperature in the preheating furnace.

The reaction between the liquid water and the reducing metal requires a pressure of about 1500 lb. at 315° C. (which is suggested as a normal operating temperature), the reaction chambers being designed for one to four hours' holding time. To prepare the reducing metal, an alloy of 70 per cent. iron, 20 per cent. aluminium and 10 per cent. copper is dissolved in a caustic soda solution, leaving the iron-copper couple in a highly dispersed condition. In this highly porous form the reducing metal may be pumped as a water suspension. If the method is capable of extended commercial development it will offer the great advantage of high-purity hydrogen gas while using the normal reduction gases.

Hydrogen from Water Gas

A typical water gas made from good-quality coke will contain approximately 50 per cent. hydrogen together with 40 per cent. carbon monoxide and about 5 per cent. nitrogen and methane. By reacting the carbon monoxide catalytically with the steam, further hydrogen may be liberated with the formation of carbon dioxide. These reactions constitute the basis of a most important method of hydrogen production, a very large percentage of the hydrogen required in this country for ammonia synthesis being produced in this manner.

Operation of a water-gas generator to give a gas mixture of the composition indicated is well known and need not be discussed here. Catalytic conversion of carbon monoxide with steam, and the purification of the resulting hydrogen from carbon dioxide and monoxide, offer some interesting problems which will be briefly outlined. The reaction involved may be expressed as:

$$CO + H_2O = CO_2 + H_2 + W \quad \ldots\ldots\ldots\ldots (6)$$

The equilibrium constant being given as:—

$$K = \frac{(CO_2)\,(H_2)}{(CO)\,(H_2O)} \quad \ldots\ldots\ldots\ldots (7)$$

The variation of the equilibrium constant with temperature is given by:—

$$d(\log K)/dT = W/RT^2 \quad \ldots\ldots\ldots\ldots (8)$$

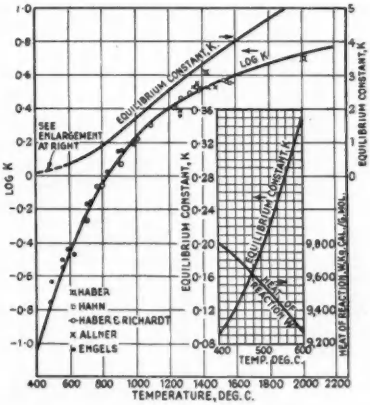


Fig. 6. Equilibrium constant and heat of reaction for water gas reaction at various temperatures (Laupichler).

Fig. 6 shows experimentally determined values of the logarithm of the equilibrium constant (log K) plotted against temperature. In the critically important commercial range (400-600° C.) the curve of the equilibrium constant K could not be determined directly from the log K curve. Laupichler[10] demonstrates, however, that the curve shown in the insert in Fig. 6 for the values of K against temperature may be derived by integrating graphically equation (8), so enabling the integration constant to be determined in the equation: $K = f(T) - C$. Values of C may be determined in the range 800-1400° C. where the slope of the log

K curve is well defined. With the values of C known, the K curve shown in the insert for the range 400-600° C. was then determined.

From the data so obtained it is possible to calculate the degree of conversion of carbon monoxide at any given temperature with any given mixture of the gases. Assuming the concentrations before reaction to be :—

1 mol. CO
c mol. CO_2
d mol. H_2
b mol. H_2O
e mol. inert gases

then if x mol. of CO are converted the corresponding concentrations after conversion are $(1-x)$, $(c+x)$, $(d+x)$, $(b-x)$, while e is unchanged. Then at any given temperature x may be determined from the equation :—

$$\frac{(1-x)\,(b-x)}{(c+x)\,(d+x)} = \frac{1}{K} \quad \ldots\ldots\ldots\ldots (9)$$

Oustanding facts about the conversion of carbon monoxide by steam include the following : (1) The reaction velocity increases with the temperature.

(2) The percentage conversion decreases with increase in temperature. The combination of (1) and (2) makes it essential to carry out the reaction in two stages. In the first stage the gas mixture enters the converter at the appropriate temperature for the particular catalyst (usually 470-480° C.), the temperature rising rapidly because of the heat of reaction. With the rise in temperature the velocity of the reaction increases, only a relatively small quantity of catalyst being required to effect 70 to 80 per cent. conversion. To ensure a high final conversion, the gas must be cooled before introduction to the second converter. In this converter the available heat from the reaction is less and the final exit temperature considerably lower than in the first. Rate of reaction is slower and the quantity of catalyst required to effect equilibrium is very much

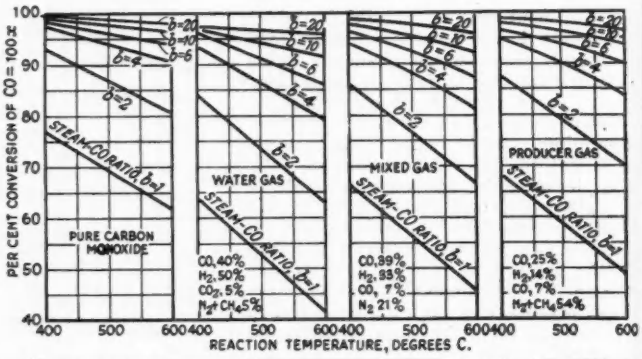

PER CENT CONVERSION OF CO = 100 x
REACTION TEMPERATURE, DEGREES C.
PURE CARBON MONOXIDE
WATER GAS
MIXED GAS
PRODUCER GAS
STEAM-CO RATIO, b=1
CO, 40% H2, 50% CO2, 5% N2+CH4, 5%
CO, 39% H2, 33% CO2, 7% N2, 21%
CO, 25% H2, 14% CO2, 7% N2+CH4, 54%

Fig. 7a. Percentage conversion of CO at various temperatures for various steam/CO ratios.

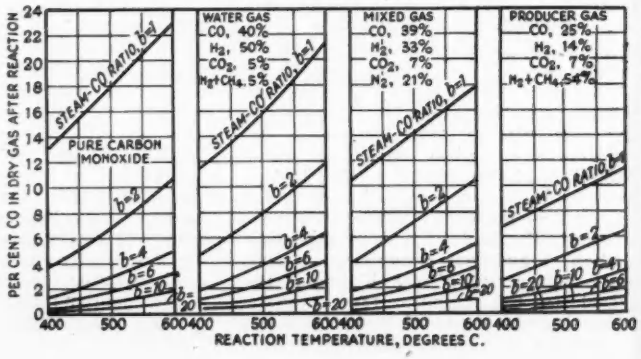

PER CENT CO IN DRY GAS AFTER REACTION
REACTION TEMPERATURE, DEGREES C.
PURE CARBON MONOXIDE
WATER GAS
MIXED GAS
PRODUCER GAS
STEAM-CO RATIO, b=1
CO, 40% H2, 50% CO2, 5% N2+CH4, 5%
CO, 39% H2, 33% CO2, 7% N2, 21%
CO, 25% H2, 14% CO2, 7% N2+CH4, 54%

Fig. 7b. Percentage CO in dry gases after conversion for various reaction temperatures and steam/CO ratios (Laupichler).

greater. The lower gas exit temperature, however, makes possible a much higher degree of conversion, which can approach 95 per cent.

(3) The equilibrium may be displaced to favour hydrogen production by using excess steam and by removing the carbon dioxide and/or hydrogen as it is formed. In commercial practice excess steam is always employed to displace the equilibrium in favour of hydrogen production, since only by this means is high conversion efficiency rendered possible. Steam costs represent a considerable item in hydrogen production and every endeavour is made to reduce the quantities required. Even under the best conditions it is difficult to reduce the excess steam much below six times the theoretical quantity.

From the above it is evident that the quantities of excess steam and the temperature in the converters are the two dominant factors in the practical control of the process, the influence of these two factors on the percentage conversion and composition of the dry gases after conversion being shown in Fig. 7. From these curves it is obvious that the temperature at the end of the process should be as low as possible, both to increase the percentage conversion and to reduce the amount of excess steam required.

(To be concluded)

KAZAKHSTAN'S MINERALS

Kazakhstan, a Soviet province in west-central Asia, may well develop into one of Soviet Russia's chief mining regions. Coal and oil, ferrous, non-ferrous, and rare metals, abrasives, and building materials are only a few of the useful minerals of which occurrences are known. An important seam of high-quality coal has been discovered in the Irtysh River basin, and large coal reserves were found in the vicinity of Akmolinsk, where the first mine has already been opened. A manganese deposit has also recently been prospected. In view of the occurrences of iron and manganese ore in central Kazakhstan the construction of a metallurgical plant is under consideration. Northern Kazakhstan has a wealth of bauxite, and the world's largest vanadium deposits have been discovered in this province.

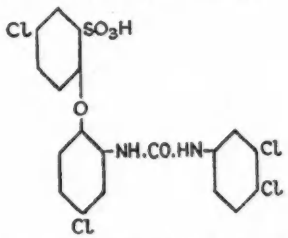
A large phosphorite deposit has been opened in the Kara-tau mountains, and the first section of a mining-chemical combine has been completed there. Deposits of fire-resisting clays, quartz, limestone and other raw materials have been prospected.

NYLON RECOVERY

Recovery of waste and contaminated nylon material is being undertaken in a new unit of the Du Pont nylon plant at Seaford, Delaware. The recovered adipic acid and hexamethylene diamine when remixed and clarified make up a polymer equal in quality to the original polymer synthesised from raw materials. The waste is first hydrolysed in a sulphuric acid solution, and is broken down into crude adipic acid and diamine sulphate. The adipic acid, in the purification process, is dissolved, passed through a filter press, and several times crystallised and centrifuged before being ready for remixing. The diamine sulphate is neutralised with lime, and the resultant calcium sulphate separated out in a centrifuge. The filtrate (dilute diamine) is piped to a 40-ft. bubble-cap distillation column, where water is first removed at atmospheric pressure; afterwards a vacuum pump lowers the pressure so that the diamine can be distilled and condensed in a pure state, ready for remixing with the purified adipic acid.

MOTH-PROOFING AGENTS

Indications of the development of new moth-proofing agents in use in Switzerland and Germany are included in the October issue of *J. Text. Inst.* (pp. A420, 423). In an article by C. Lauger (*Helv. Chim. Acta*, 1944, 27, 71) is discussed the chemistry of agents suitable for application by the methods used for dyes. These researches, dealing with agents containing sulphonic groups, led to the discovery of Mitin FF (Geigy), the formula of which is:



In Ger. Pat. No. 735,092 (1943), assigned to I. G. Farben, Brodersen and Quaedvlieg recommend the use of heavy metal salts, preferably copper salts, of trithiocarbonic acid (H_2CS_3), or its analogues with higher sulphur content, for precipitation on fibres for moth-proofing purposes.

Parliamentary Topics

Ammonium Nitrate

IN the House of Commons last week, Mr. E. P. Smith asked the Minister of Supply whether his attention had been directed to the progress made in Canada in the utilisation of ammonium nitrate made in explosive factories as a fertiliser; whether he was aware that the Canadians have overcome the previous objectionable quality of caking (*see* THE CHEMICAL AGE, November 18, p. 478); and whether he would see that this system was made available to those charged with the disposal of ammonium nitrate as it arises from surplus ammunition.

Sir A. Duncan replied that the information on this subject received from Canada was being considered in connection with the question of the recovery of ammonium nitrate from surplus ammunition and the conversion of ordnance ammonium nitrate for fertiliser use.

Mr. E. P. Smith asked the Minister of Agriculture whether he was aware that 183,000 tons of ammonium nitrate had been exported by Canada, as surplus to her requirements, to South Africa, New Zealand, Australia and the U.S.A., but none to Great Britain; and would he arrange that trials of this fertiliser were made during next season.

Mr. Hudson stated that he was aware that substantial quantities of ammonium nitrate had been exported from Canada, but that imports into the United Kingdom were not necessary since home production of suitable nitrogenous fertilisers was more than sufficient to meet the increased war-time demand.

Scientific Research

Captain Strickland asked the Minister of Production whether he was aware that the U.S.A. had already established a branch of the Office of Scientific Research and Development in Paris; and whether he proposed to make any similar arrangements for the scientific advisers of his Department to be represented either in France or Belgium.

Mr. Lyttelton said that he was aware that plans were being made to establish such a branch office in Paris. The question whether any corresponding arrangements were necessary on the British side was under consideration.

Penicillin Plant

Mr. Kirby asked the Minister of Supply what progress had been made in the construction and equipping of a penicillin plant at Speke, Liverpool; when it would be completed; and how many workers would be employed.

Mr. Peat said that building and civil engineering work was well up to schedule and plant and equipment was in fabrication. The plant would be completed by the late spring of 1945 and would employ about 350 people.

International Cartels

Mr. A. Edwards asked the President of the Board of Trade whether he could state in how many British cartel agreements did German industry participate before the war, whether he could give a list of such industries, whether such agreements had been subject to examination by official quarters, and in how many cases there was a clause according to which, in the event of war, cartel arrangements would be resumed afterwards.

Mr. Dalton : A substantial number of such agreements is known to the Board of Trade. I will consider the possibility of drawing up a list of the industries concerned. I know of no case where an agreement contained a clause providing for resumption at the conclusion of hostilities.

Patents (U.S.S.R.)

In reply to Sir W. Smithers, Mr. Dalton said that patent protection was afforded in the U.S.S.R. for British or other inventions by Soviet Law.

LETTER TO THE EDITOR

Scientific Textbooks

SIR,—If I may be allowed a comment on the letter from Mr. A. Krajkeman in your issue of November 25, it seems to me that Mr. Krajkeman's observations are drawn from pre-war experience. We cannot know the extent to which German science books have penetrated into the occupied countries during the last four years, but we do know that British books have not merely not penetrated the Continent of Europe, but they have ceased to appear even in our own country. At the present time, practically the only chemical books of note which are appearing are issued from the U.S.A. It is difficult frequently to obtain copies of these volumes, and our reviewers comment on the small number of references to British articles which appear in these books. The British Government and the British public have concentrated on the war, but it seems to me that if we are to hold our own, let alone obtain any sort of pre-eminence after the war is over, it is now time that paper be released for the publication of British text-books, and that British authors be encouraged to write authoritative books not only for our own use, but also for the use of the world at large.

As we have concentrated on winning the war so must we now begin to prepare to concentrate on winning the peace, if there is to be peace.—Yours faithfully,

THOMAS MCLACHLAN.

SAFETY FIRST

Personal Safety in Handling Chemicals—III

by JOHN CREEVEY

IN cases of injury to the eyes in industry, causing at least one day of disability, the time lost averages 10 days; out of every 200 cases, one suffers complete loss of vision in one or both eyes. These figures apply both to industry generally, and to the chemical and chemical-using industries, and they show that there is still much to be done about encouraging or enforcing the wearing of goggles in circumstances where eye injuries are likely to arise. Although goggles may be provided, there is still some reluctance to make the fullest use of them, except in those instances which are recognised as especially hazardous.

The Use of Goggles

In handling chemicals, goggles are provided mainly as a protection against splashes of strong acids or alkalis; they also serve to avoid injury from splashes of hot liquids generally, the sputtering of fused masses or high concentrations of some chemical in the course of evaporation, from dust clouds and injurious fumes, and from flying fragments caused by the bursting of reaction apparatus. Very little acid or alkali is needed to cause a serious eye injury; the same may be said of really hot liquids which are otherwise harmless, as well as of a sudden release of steam from a valve. Likewise, the continuous exposure of the eyes to mist which carries a small percentage of acid or alkali has adverse effects in due course if goggles are not worn, for the tissue of the eye is delicate and, though the movement of the lids, in conjunction with fluids secreted by the glands of the eye socket, provides a natural means of washing the surface of the eyeball, the continuous exposure of the eye to chemical fumes does not fall under the same heading as, say, the effect of windborne dust from the dry surface of a ploughed field.

In every recognised code of safety standards it will be seen that eye protection must be afforded to all employees engaged on work which directly endangers their eyes; such operations include the pouring of molten metals, the handling of corrosive chemicals, dry grinding, scaling, chipping, cutting and welding. Eye protection is also needed by employees exposed to gases or fumes which are injurious to the eye. In addition, where the work done also endangers others who are compelled to work in proximity to such operations, these other employees must also be given protection for their eyes. This eye protection is provided by goggles, except where eye hazards are effectively removed by the interposition of screens or shields, or by the wearing of helmets or face masks.

Where there is danger from spray or splashing, the goggles should fully enclose the eyes and have a rubber frame so that close contact is made with the face for the purpose of giving the highest possible measure of protection. In cases of exposure to a light mist of acid, close-fitting eye-cup goggles can be used. The makers of goggles have provided a range of types from which each particular need of the chemical industry can be met, and users should avail themselves of the advice available in selecting the correct form of goggles. In the general case of handling acid, chemical-type goggles are required if heavy splashing is likely; in other cases, protective spectacles with side shields may give all the protection needed. These protective spectacles are considerably more comfortable to wear than are the chemical-type goggles, and on this account they are more likely to be worn regularly, an important point to consider when eye protection is needed over long periods, especially with workers who seem to experience discomfort. A face-screen worn by the worker has advantages over goggles in certain specific cases; this face-screen consists of a light-weight head-band to which a screen of non-inflammable material is attached, so that it stands well away from the face and thus also permits the wearing of spectacles, if needed. Above the vizor is a hood of cellular material which ensures good ventilation; moreover, the angle of the vizor is adjustable and side screws are provided for fixing it. It is not suggested that this face-screen takes the place of goggles where the latter are really needed, but there are instances in the handling of chemicals where it will provide good protection in the hazards to be faced.

Protection Against Splashing

Even the best-fitting chemical-type goggles will not always prevent part of a heavy splash from reaching the eyes; this is the case where the major part of the splash is caught upon the forehead and thence runs behind the goggles. To avoid this, so far as possible, there must be adequate thickness of rubber at all points where the

framework of the goggles makes contact with the face, and that rubber must be sufficiently soft and pliable to ensure the closest contact without discomfort due to pressure; the ideal is attained by the use of a cushion of fine sponge-rubber round the edges of the frame. If it is necessary to test goggles of different types to ascertain which is most serviceable for a particular job, be sure that the workers selected for this task are experienced men, and avoid tests which are especially hazardous unless adequate precautions are taken for the first tests. Remember that water and certain liquids do not always act in the same manner; oil will creep through a crevice considerably finer than one permitting the passage of water. If water is thrown against a pair of goggles from different angles, and even squirted direct into the ventilation louvres, it does not always follow that the wearer of those goggles will be completely protected against caustic alkali or certain acids, which have a peculiar way of creeping after a splash has occurred.

Protective Masks

When moisture adheres to the outside of the lenses and impairs the vision—the result of considerable splashing, perhaps—it is possible to avoid much trouble by providing a mask of fine bronze mesh, additionally to the goggles. Such a mask will keep splashes from reaching the goggles, as well as parts of the face which are otherwise unprotected, and if the mesh is sufficiently fine there is reasonably efficient vision. These screens provide good protection against splashes of molten metal; in an acid-laden atmosphere the bronze must be resistant to the acid, otherwise impairment of vision as a result of corrosion is likely to be more serious than actual deterioration of the screen. The fogging of goggles by steam or vapours can be controlled by coating the lenses with anti-dim preparations.

In every detail, chemical-type goggles should be designed to give the greatest possible protection against the hazards of the chemical industry; lenses should provide the maximum resistance against impact, the eye-cups should be shaped anatomically, the head-band should be adjustable and comfortable, and it must not be forgotten that a worker may have to wear these goggles continuously for at least half the duration of an eight-hour shift. The side shields should be provided with solid baffle plates for protection against splashing chemicals and fine particles; and there must be ample ventilation to keep the eyes cool and to prevent the fogging of the lenses. In some patterns this is attained by the provision of slots in the lens rings and in the eye-cups and side shields. It is most essential that where the danger of impact exists, lenses and frames shall be strong enough to reduce effectually the danger of breaking. For use in presence of gases or vapours which are injurious to the eye, the goggles must be absolutely gas-tight.

Goggles will still not provide the maximum eye safety unless they have been properly fitted to the wearer. Where the goggles are too wide for the face, the eyes will not look through the centre of each lens. Adjustment may be needed also for the head-band, which should pass above the ears and encircle the back of the neck at the lowest point which is convenient and comfortable.

Cleaning Methods

It is essential that a pair of gogles be properly cleaned each day before being used. Both screens and lenses should be washed with soap and water, then rinsed and carefully wiped with a clean cloth kept for that purpose and frequently renewed. In cleaning, the eye-cups, lens rings, and side screens should be lightly scrubbed with a fairly stiff brush. When clean, they should be sterilised at regular intervals, and always before being transferred from one worker to another. This is essential to avoid the passing of eye infections and skin rashes, and it should be done by some responsible person. Various methods are available for sterilising goggles; they may be allowed to remain in a moist atmosphere of formaldehyde (in a closed container) at room temperature for not less than 10 minutes, or they may be soaked for 10 minutes in a mixture of 1 part 40 per cent. formaldehyde with 9 parts water and then rinsed in hot water and allowed to dry. Dipping in a 70 per cent. solution of denatured alcohol and then allowing to dry is also effective; a 3 per cent. solution of cresol can also be used as a dipping medium, but this necessitates very thorough washing in water to be sure that all traces of cresol are removed.

The man with one eye, who happens to be employed where eye injuries are likely to result, should be found some other sphere of work; otherwise his employment should be made conditional upon rigid observance of all precautions and wearing goggles whenever there is the least need. This man, who has already lost one eye by an accident, is not always as careful as one would have thought experience made him. In the *Industrial Accident Prevention Bulletin* (March, 1942), it is recorded that a one-eyed man was found working as a welder's mate; his head was turned to one side to prevent the glare of the arc from reaching his good eye, and his goggles were hanging round his neck, though he was well aware that they had been issued to him for a definite purpose.

Industrial Safety Gleanings

Some Notes from America

Liquid Oxygen

LIQUID oxygen and the precautions to be observed in handling it are the subject of a safety digest recently issued by the National Safety Council, of Chicago. A description of the production, uses, and properties of liquid oxygen, and a summary of the safety precautions are appended.

The physical properties of the atmospheric gases are such that a mixture of liquid oxygen and liquid nitrogen, such as is contained in medium-purity liquid oxygen, tends to become higher in oxygen content as the mixture is stored or used. For this reason it is good safety practice to observe in the use of all such mixtures the same precautions as with high-purity liquid oxygen. Liquid oxygen should be used only by persons familiar with its properties and skilled in its use.

The particular use to be made of the liquid may demand that special precautions be taken, and if such precautions are not known to the person using the material, they should first be determined. Each use should be analysed, from a safety point of view, by a competent technician before it is instituted.

Acetic Anhydride

The limits of inflammability and ignition temperatures of acetic anhydride $(CH_3CO)_2O$, are dealt with in a report (R.I. 3741) of the U.S. Bureau of Mines. A liquid at ordinary temperatures, acetic anhydride is used in the preparation of a number of organic chemicals and in the manufacture of photographic film and of artificial silk. It is perhaps the most important acetylating agent for industrial uses—a property that is important in the manufacture of munitions.

From tests with samples, Jones, Scott and Scott found that the temperatures between which air saturated with acetic anhydride vapour forms inflammable mixtures were 47.3° and 74.4° C. These limits correspond to concentrations of 2.67 and 10.13 per cent. by volume. All mixtures between these percentages at the temperatures given above are inflammable. The flash point by the standard closed cup tester was found to be 51° C., and the ignition temperatures were found to be 392° C. in air and 361° C. in oxygen.

Toxicity of DDT

Toxicological studies of the synthetic insecticide DDT, made at the Division of Pharmacology, Food and Drug Administration, Federal Security Agency, Washington, by Draize *et al.*, are reported in *Chem. Eng. News* (1944, *22*, 17, 1503). Tests were made with rabbits, rats, guinea pigs, dogs and chicks, both with application to the skin and with feeding. In powder form the material had no effect on the skin, but the application of a 30 per cent. solution in dimethyl phthalate caused distinct, but irregular, toxic effects. With the feeding experiments a similar irregularity was noticed. Doses of 500 and 1000 p.p.m. in corn oil killed all chicks, with characteristic toxic signs, within two weeks; but with a "chronic" dose of 50 mg. per kg. per day for 50 weeks one dog died after 34 weeks, while the others appeared normal after 50 weeks.

These experiments have shown that DDT is a poisonous substance which should be used only after adequate investigations have indicated that it is safe for the particular use. DDT in solution should be handled with care and its use on the skin carefully restricted. It appears to be either irregularly absorbed or irregularly metabolised, thus making it difficult to establish an absolutely safe level for ingestion. Experiments extending over periods of time longer than 50 weeks will be necessary before the chronic toxicity can be adequately assessed.

Safety Conference

At the 33rd congress of the National Safety Council, Chicago, the president, Col. J. Stilwell, reported a marked decrease in all types of accidents, as a direct result of the increased endeavours of the Council. In explosives plants, for example, a 26 per cent. drop in accident frequency and a 41 per cent. fall in severity were recorded.

An interesting session of the Council's chemical section dealt with the safe disposal of waste. Mr. A. L. Cobb, of the Eastman Kodak Co., spoke on the disposal of materials which could not be safely dumped. A burning-ground for such materials should be remote from plant buildings and other structures—a point of particular importance when the waste gives off toxic fumes when burning. Damage to crops, as well as to humans and animals, had also to be borne in mind. Explosive waste must be burned under the supervision of a safety engineer; and, as an extra precaution, the area should be damped down with a sprinkler waggon after a day's burning.

The re-use of toxic and inflammable waste gases was urged by Mr. W. F. Reinhard (Linde Air Products, Ltd.), not only for safety, but also for economy's sake.

New Control Orders

Chlorates

The Control of Chlorates (No. 2) (Revocation) Order, 1944 (S.R. & O. 1944, No. 1354), revokes the Control of Chlorates (No. 1) Order, 1941. The No. 2 Order, dated December 5, becomes operative forthwith, and from that date licenses are no longer necessary for the acquisition and disposal of chlorates. Supplies, however, are still restricted and under arrangements with the producers releases for the time being will be on substantially the same basis as hitherto.

Fertilisers

The Control of Fertilisers (No. 29) Order, 1944 (S.R. & O. 1944, No. 1348), which came into force on December 11, provides a maximum price of £19 15s. for sulphate of potash guaranteed to contain not less than 50 per cent. K_2O in addition to the maximum price of £18 15s. provided by previous Orders for sulphate of potash guaranteed to contain not less than 48 per cent. K_2O.

Personal Notes

DR. J. NEEDHAM, F.R.S., director of the British Council Cultural Scientific Office in China, has, after nearly two years in China, returned to this country for consultations.

PROFESSOR A. V. HILL, who is one of the Members of Parliament for the University of Cambridge, has announced his intention of not seeking re-election at the next General Election.

SIR HENRY SELF is succeeding Sir Charles Hambro as U.K. member of the Combined Raw Materials Board at Washington. The deputy member of the Board will be MR. GEORGE ARCHER, who will also act as head of the British Raw Materials Mission.

Among the 15 members of the new Overseas Trade Development Council, whose appointment has been announced by Mr. Harcourt Johnstone, Secretary of the Department of Overseas Trade, are LORD GLENCONNER, a director of I.C.I., MR. CHARLES S. MARRIAN, chairman of British Xylonite, and SIR JOHN G. NICHOLSON, deputy-chairman of I.C.I.

MR. JOHN W. MOORCROFT, of Dukinfield, Cheshire, a processman in the benzol department of John W. Leitch & Co., Ltd., aniline dye manufacturers and makers of intermediate products, Milnsbridge, Huddersfield, was presented, on December 6, with an 8-day mahogany chiming clock as a token of appreciation of his 30 years' service in the company's works. Dr. A. Everest, the managing director, in making the presentation, expressed the company's thanks and the hope that Mr. Moorcroft would be spared to them for many more years.

MR. H. E. MAKEPEACE, who recently retired from the position of overseas manager of Burroughs Wellcome & Co., with whom he was associated for over 43 years, was the guest of honour at a luncheon at the Savoy Hotel on December 6, given by the chairman of the Anglo-Iranian Pharmaceutical Co., Ltd. (Mr. C. L. Saul, of Boots Pure Drug Co.), to mark the retirement of Mr. Makepeace from the Board of that company on which he represented Burroughs Wellcome & Co., Mr. Makepeace has had long experience of the export trade, and was for four years a member of the Executive Committee of the Pharmaceutical Export Group.

Obituary

MR. J. H. GUNTER, who was for 25 years works manager with Dorman, Long & Co., Ltd., Middlesbrough, has died at the age of 90.

DR. THOMAS MIDGLEY, president of the American Chemical Society and chairman of the Society's board of directors, died at Worthington, Ohio, on November 2, aged

Dr. Thomas Midgley.

55. His activities had been impaired by an attack of poliomyelitis in 1940, and his death was due to accidental strangulation in his sleep, and was caused by a device which he had invented to assist him in his movements. Dr. Midgley's fame in the chemical world was based on his fundamental researches in the fields of natural and synthetic rubber and petroleum fuels. Perhaps the most popularly famous among his many inventions (more than 100 patents stand in his name) was the discovery of tetraethyl lead as an anti-knock addition to motor fuel; equally important was the discovery of the Freons (alkyl chloro-

fluorides) as non-toxic and non-inflammable refrigerants. He was also profoundly concerned with the production of bromine from sea water.

Honours were showered upon him in the course of his brilliant career: he held the Nichols, Priestley, and Willard Gibbs Medals of the American Chemical Society, as well as the Langstreth Medal of the Franklin Institute, and the Perkin Medal of the Society of Chemical Industry. On the industrial side he was a vice-president of the Ethyl Gasoline Corporation, and of Kinetic Chemicals, Inc., and a director of the Ethyl-Dow Chemical Company.

Almost his last official act, and a task which gave him great pleasure, was the signature, on October 26, of the trust deed creating the Petroleum Research Fund, by which the American Chemical Society became the beneficiary of the income from the securities held by Universal Oil Products Company, the huge research corporation jointly owned by seven great oil companies, as announced in THE CHEMICAL AGE on September 16 (p. 274).

BRITISH PETROLEUM

The technical aspects of petroleum production in Great Britain, some indication of the development of which was reported in THE CHEMICAL AGE on September 30 (p. 327), were the subject of a lecture, given in London on December 6, before the Royal Society of Arts, by Mr. C. A. P. Southwell, of the Anglo-Iranian Oil Co., Ltd. The lecturer described the developments during this war which have given this country a modest place among the world's oil producers. He dwelt on the important part played by geophysical technique, especially the "subsurface Radar" in locating oil, and indicated the importance of microchemical soil analysis and of the contribution made by colloidal chemistry in the form of bentonite mud-drilling mixture. Originally, a team of American oil workers was employed on drilling operations, but after a year, and following a course of training, it was found practicable to employ British workers. And now a force of some 1,000 men—including ex-miners—is engaged on the job.

General News——From Week to Week

Ministry of Supply employees have contributed nearly £10,000 to the Red Cross Penny-a-Week Fund.

The board of Crystalate, Ltd., announce that a financial reconstruction scheme for the company will be put forward early in the new year.

At the recent annual meeting of the British Barytes Producers' Association, the executive officers were all re-elected for another year.

The Ministry of Supply announces that traders may now obtain from Ministry stocks of certain grades of shellac for re-export to approved destinations. Further information may be obtained through the usual trade channels.

The Ministry of Food announces that there will be no change in the existing prices of refined oils and imported edible animal fats allocated to primary wholesales and large trade users during the eight-week period ending February 3, 1945.

The Minister of Fuel and Power announces that, owing to increased requirements for essential war production, the supply of coke for the ordinary industrial and domestic market must be restricted. Local shortages are likely to be unavoidable, and consumers are urged to exercise the utmost economy.

The Pharmaceutical Society of Great Britain has decided to ask the Minister of Health to supervise the advertising of certain proprietary medicines and medical and surgical appliances "so that the public can be protected against this type of misrepresentation." The fears of the public are exploited, the Society states, and its credulity traded upon to the extent of £20,000,000 a year. In the United States the American Medical Association registers approved products after examining them chemically, pharmacologically, and, if necessary, clinically, at a cost of £10,000 a year.

The Oil and Colour Chemists' Association (Manchester Section) held, on December 15, an open discussion on three topical subjects, viz., Acid Value and Saponification Tests, introduced by Mr. N. Strafford, who described the results of co-operative research carried out on a sample of polymerised linseed oil, which clearly indicate that a standardised test procedure requires to be adopted; Sieving and Bulk Density Tests on Pigments, introduced by the chairman, Mr. D. M. Wilson; and Standardised Tests on Pigments, introduced by F. A. Walker, who made reference to precautions necessary to ensure that tests are carried out under equal conditions.

Foreign News

A rich deposit of tungsten ore has been found near Hermosilla, Mexico, and is already in exploitation, according to local press reports.

From Palestine comes the news that a Weizmann memorial department of chemical technology has been inaugurated, while the Hebrew University, Jerusalem, has instituted a Chaim Weizmann school of chemistry.

Corning Glass Works is further expanding its Latin American interests. The company has now purchased a substantial interest in Vidraria Santa Marina, Sao Paulo, a leading glass company of Brazil.

As a result of three year's experiments by two young Swedish Scientists of Upsala University, Groenwall and Ingelman, an artificial blood plasma, capable of use by injection into the veins, was found in the course of experiments with sugar. The new substance is named "Dextran"; it is reducible to powder form and soluble in water.

New chemical factories continue to be established in Spain. Among the most recent are a factory for fluorspar products at Rivadesella (Oviedo), by Derivados Espato Fluor, S.L.; a saccharin plant at Alicante, by E. Pérez Cadafalch; and a laboratory furnishing works in Madrid, by L. Vázquez Colls.

Dichlorostyrene is the basis both of a new heat-resistant plastic and of a synthetic rubber, which have been developed in the U.S. by the Mathieson Alkali Works and are now undergoing tests. The polymerised plastic is reported to be of special value where high insulating qualities are demanded; it differs from polystyrene in its greater resistance to heat and to water. The rubber is compounded with butadiene.

A mixture of four lead salts for priming ammunition has been patented in the U.S. by P. H. Burdett and G. M. Calhoun (U.S.P. 2,356,211). The new mixture contains lead styphnate, nitrate, sulphocyanate, and triazoacetate, together with powdered glass. The lead triazoacetate sensitises the lead styphnate and makes the latter an effective igniting agent for the powder in the cartridge. The mixture has been assigned to the Remington Arms Company.

The Division of Industrial Chemistry of the Council for Scientific and Industrial Research in Australia has developed a new process for recovering tin from lode tin ores. The gravitation method used at present for the separation of tin from waste is replaced by the flotation method. It is hoped that this process will facilitate both the separation of a large proportion of the tin at present being discarded with the "tailings" and the recovery of tin left in dumps from former mining operations.

The U.S. Bureau of Ships announces that research workers have produced a fire-retarding paint which reduces the fire hazard aboard ships, by including active fire-retarding ingredients such as antimony oxide and reducing the linseed oil and other inflammable materials.

Large increases in output of molybdenum, tungsten, and gold from the Siberian maritime province of Khabarovsk are recorded by *Pravda*. Munitions of war have been produced for 2½ years at the metallurgical works at Amurstal, on the Amur; and the canning of fish has also been increased.

The value of gases produced in Canada was $9,212,226 in 1943, an increase of slightly more than 12 per cent. over the 1942 figure. Output of oxygen amounted to 636,281,176 cu. ft.; acetylene totalled 114,111,176 cu. ft.; and carbon dioxide 19,939,470 pounds. Hydrogen production rose 6.3 per cent. to 42,933,752 cu. ft. Other products included aqua ammonia, anhydrous ammonia, nitrogen and nitrous oxide.

Tanganyika's three largest gold mines are still producing, their output, although reduced, being greater than that of all other East African Dependencies put together. After the war, a recovery will occur, according to the Mines Department. Industrial diamonds, mica and tin are making valuable contributions to war industries. Production of lead, coal, graphite, soapstone and kaolin has been developed during the war and may broaden Tanganyika's mineral industry in peacetime.

The rarer elements contained in coal are discussed in a Technical Paper (No. 669) of the U.S. Bureau of Mines, by F. H. Gibson and W. A. Selvig. It does not appear that commercial recovery of any of these elements is likely to be worth while, with the possible exceptions of germanium and gallium, potential sources of which have been detected in certain English flue dusts from gas works. The paper is obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, 25, D.C., at the cost of 10 cents.

A useful bulletin, entitled "Physical Properties Pertinent to the Storage of a number of Commercially Important Liquids and Gases," prepared by Garner, Adams, and Stuchell, of the Chemical Storage Fellowship at the Mellon Institute, Pittsburgh, has been published by the Pittsburgh-Des Moines Steel Company. In addition to the tables of physical properties of 91 materials, it includes some useful conversion tables, and charts showing the variation in the specific heats of many of the substances concerned. British chemists using the tables will regret that the data involving temperature are given in degrees Fahrenheit.

Methyl and ethyl bromide, in the presence of aluminium bromide, will alkylate butanes to give substantial yields of pentanes and hexanes respectively, as well as some higher paraffins, according to J. D. Heldman (*J. Amer. Chem. Soc.*, 1944, *66*, 1791), who, as a National Research Fellow in Chemistry, has been studying the catalytic isomerisation of paraffin hydrocarbons.

An Australian broadcast, discussing the extensive research and experiments undertaken in Japan by the Iwate Aluminium Company, announces that it has not been possible to develop a satisfactory method of producing aluminium from the local aluminous clay. The Iwate Company, however, has applied to the Munitions Ministry for the necessary permit to instal a new plant.

A handsomely produced manual, entitled *Cellulose Plastics in War and Industry* has been published by the Celanese Celluloid Corporation of New York to indicate the specifications, properties, and applications of their products, Lumarith (cellulose acetate) and Celluloid (cellulose nitrate), with their derivatives, Lumarith E.C. (ethyl cellulose), Lumarith E.R. (ethyl rubber), as well as aryl phosphate ester plasticisers (Lindol and Celluflex) and lubricants (Lindol E.P. and Cellulube).

Five new plants are being put into operation by the Standard Oil Co. (Indiana) for the production of isobutane and aviation spirit components by the isomerisation of light paraffinic hydrocarbons. Three separate new processes are employed for the isomerisation of light naphtha, pentane, and butane. A plant at Whiting (Ind.) produces "isomate" (a mixture, mainly of isopentane and neohexane, from naphtha); two isobutane plants are located at Whiting (Ind.) and Wood River (Ill.); neohexane is produced from the Salt Lake City (Utah.) plant, and isopentane from Texas City.

Forthcoming Events

The twenty-seventh annual general meeting of the **British Association of Chemists** will take place at the Royal Station Hotel, York, on **December 16,** at 2.30 p.m.

The Institution of Chemical Engineers (North-Western Branch) meets on **December 16,** at 3 p.m., in the Reynolds Hall, the College of Technology, Manchester, to hear a paper on "Some Principles of Chemical Plant Design," presented by Mr. W. H. Demuth.

A meeting of the **Electrodepositors' Technical Society** will take place at the Northampton Polytechnic, St. John Street, London, E.C.1, on **December 18,** at 5.30 p.m., when a paper on "Value of Electro-Deposited Tin as an Undercoating" will be presented by Dr. S. Wernick.

The Dalton Lecture of the Manchester and District Section, **Royal Institute of Chemistry,** will be given at 6.30 p.m., on **December 19,** at the Manchester Central Library, by Dr. Clibbens of the Shirley Institute. The subject is "Chemistry and Clothing," and members of the **Textile Institute** are specially invited.

Dr. F. M. Lea, O.B.E., will deliver a lecture on "Cement and Concrete" on **December 19,** at 2.30 before the **Royal Institute of Chemistry** at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

At a further meeting in the second series of technical discussions on Fuel Economy in the chemical industry, arranged by the **A.B.C.M.,** Mr. P. M. K. Embling and Mr. H. Truman, of the Power Gas Corporation, Limited, will read a paper on "Efficient Production and Utilisation of Fuel Gases." The meeting will take place on **December 13,** at 3 p.m., in Reynolds Hall, College of Technology, Manchester, and will be repeated on **December 20,** at 2.30 p.m., in the Lecture Hall of the Royal Society of Tropical Medicine and Hygiene, Manor House, 26 Portland Place, London, W.1. As previously, non-members of the Association are invited to the meetings and should notify: (for the London meeting) Mr. H. W. Vallender, Association of British Chemical Manufacturers, 166, Piccadilly, London, W.1; (for the Manchester meeting) Mr. W. Murray, The Liverpool Borax Co., Ltd., Maxwell House, 6, St. Pauls Square, Liverpool, 3, not later than the day before the meeting.

The **Association for Scientific Photography** meets at Caxton Hall, S.W.1, on **December 30,** at 2.30 p.m., when papers on "The Choice of Materials for Scientific Photography," will be read by Dr. H. Baines, and Mr. F. J. Tritton.

A conference to discuss the use of science in the post-war world will be held at the Caxton Hall, S.W.1, on February 17-18, 1945, organised by the Association of Scientific Workers in order to draw attention to the need for science to be used as fully in peace time as it has been during the war. In earlier conferences the Association has dealt with the integration of science in the war effort, the need for more central planning and for more use of the initiative of the younger working scientists. It is now necessary to show in practical terms what science and technology can do to provide the basis for an expanding world economy. Further particulars will be issued later, and may be obtained from the Association of Scientific Workers, Hanover House, 73 High Holborn, London, W.C.1.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *— followed by the date of the Summary, but such total may have been reduced.)

SOUTHERN TAR DISTILLERS, LTD., London, S.W. (M., 16/12/44.) November 25, £2000 debenture to Crow Catchpole and Co., Ltd.; general charge. *Nil. November 30, 1943.

Company Winding-up Voluntarily

BRITISH NITROGEN ENGINEERING CO., LTD. (C.W.U.V., 16/12/44.) November 29 (members). D. Q. Holland, Crown House, Aldwych, W.C.2, appointed liquidator.

Company News

Egyptian Salt and Soda, Ltd., is paying an ordinary dividend of 4s. 1.305d. (5s.) for the year to August 31.

United Match Industries, Ltd., announce a first and final dividend of 33⅓ per cent. (same).

Genatosan, Ltd., reports a profit, for the year to June 30, of £131,372 (£113,271). The ordinary dividend is unchanged at 25 per cent.

Crystalate, Ltd., have made a trading profit, for the year to September 30, of £45,955 (£47,453); net profit is £11,385 (£11,322).

British Tar Products, Ltd., are paying a final dividend of 6 per cent., making 9 per cent. (10 per cent.) for the year ended September 30. The net profit was £20,906 (£23,301).

Lewis Berger and Sons have made a trading profit, for the year ended July 31, of £226,112 (£257,513). The net profit is £187,771 (£188,791). The ordinary dividend (interim of 6 per cent., final 10 per cent., and bonus 3 per cent.) is maintained at 19 per cent.

Palestine Potash, Ltd., 13 Mansfield Street, W.1, have increased their nominal capital beyond the registered capital of £800,000 by the addition of £200,000. The additional capital is divided into 200,000 6 per cent. cumulative redeemable preference shares of £1 each.

New Companies Registered

Labglas, Ltd. (391,686).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in glass, laboratory equipment, valves, etc. Directors: F. S. Lyle; F. G. Consterdine. Registered office: Broadmead House, 21 Panton Street, London, S.W.1.

Marvos Chemical Manufacturing Co. (Luton), Ltd. (391,568).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in polishes, chemicals, drugs, disinfectants, plastics, scientific apparatus and materials, etc. The directors are: E. J. Salisbury, 10 Cromwell Hill, Luton; S. L. Hughman; A. C. Chamberlain. Registered office: Piccadilly Mansions, Shaftesbury Avenue, London, W.1.

Chemical and Allied Stocks and Shares

STOCK markets were fairly steady, but generally inactive, although British Funds strengthened, and among industrials the main feature was a broadening demand for textile shares on hopeful views of post-war prospects. There were excited dealings in British Celanese 10s. ordinary, owing to special circumstances. After rising to over 41s. on the surprise maiden dividend of 15 per cent., the price reacted sharply to 35s. 9d. on the results, which show that the dividend has been made possible by a big taxation concession that more than offsets a reduction in trading profits. When the dividend was announced, the market had assumed that trading profits had risen to a higher level.

Imperial Chemical eased to 39s. B. Laporte were maintained around 82s., with Borax Consolidated 37s. 3d., Lever & Unilever 46s. 9d., and United Molasses firm at 38s. 10½d. The units of the Distillers Co. kept steady at 108s, pending the interim dividend. Dunlop Rubber were 47s. 6d., and Wall Paper Manufacturers deferred 44s. 6d. Iron and steels were generally firm. Main effect of the full terms of the big tinplate merger was a slightly easier tendency in Richard Thomas at 13s. 6d., but Baldwins strengthened to 7s. 4½d., later easing to 7s. 3d. Tube Investments were favoured on the higher profits shown by the results, and moved up to 102s. 6d., while Whitehead Iron were higher at 87s. 6d. Ruston & Hornsby showed steadiness at 49s. 6d., with Neepsend 34s. 6d., Dorman Long 27s. 7½d., and Babcock & Wilcox 53s. 3d. Imperial Smelting moved lower at 13s. 9d. on the full results, and Turner & Newall at 83s. lost an earlier improvement. Maintenance of the latter company's divi-

SAVE OIL

AND SAVE YOUR MONEY TOO!

BOTH ARE IMPERATIVE NATIONAL DUTIES NOW

It has not always been recognised that used lubricating oil could be filtered and re-used for its original purpose; but it is recognised now

- 10,000 users of Stream-Line filters have proved by experience that properly filtered oil is at least the equal of new in lubricating value
- Scientific and Commercial Testing Laboratories have proved the same.

LIMITATION OF SUPPLIES

All oil is nationally important, but for the time being filters can only be supplied to users having batches of oil of known grade sufficient to justify the size selected and having a direct use for the filtered oil.

Those unable to secure a filter at present should nevertheless save their oil. Arrangements for its disposal will be advised on request.

Write for particulars

STREAM-LINE FILTERS LTD.

Hele-Shaw Works, Ingate Place, London, S.W.8

GOOD OIL DOES NOT WEAR OUT

The BEAR fact is—
BURGESS ZEOLITE
gives longer runs between regeneration
BURGESS ZEOLITE COMPANY LIMITED
68-72, HORSEFERRY ROAD, WESTMINSTER, S.W.1. Tel: ABBey 1868

all roads lead to . . .

If we sometimes begin to feel that TEEPOL is the answer, in one form or another, to most of the aqueous problems encountered in modern chemical plants and laboratories, it's not just our natural enthusiasm. The facts are on our side!

In the many enquiries we have received about this remarkable wetting, spreading and detergent agent, there are few cases where we have not been able to show that TEEPOL materially aids in the solution of the problem concerned.

Chemically neutral, soluble in water of any hardness at any temperature, stable over a wide pH range, TEEPOL does more than answer current problems; it opens up new fields of development.

We shall be happy to arrange for our technical representative to discuss the application of TEEPOL to your own particular processes.

TEEPOL

TECHNICAL PRODUCTS LTD
ST. HELEN'S COURT, GREAT ST. HELEN'S
LONDON, E.C.3
TELEPHONE AVENUE 4321

dend at 12½ per cent. was all that was generally expected; but a return to pre-war dividend rates is looked for in the market when E.P.T. is reduced or abolished.

General Refractories were 17s. 7½d., and British Ropes firm at 8s. 3d., while Triplex Glass rallied to 44s. and Metal Box shares kept firm at 93s. 1½d. J. Brockhouse were steady at 80s. on the financial results, and Amalgamated Metal 17s. 10½d. Paint shares became firmer, with Lewis Berger 105s. 6d. xd on the results and maintained dividend. Pinchin Johnson 10s. shares were 39s., International Paint 118s. 9d., and Wailes Dove 5s. ordinary improved to 15s. 4½d. on the raising of the dividend from 12½ to 15 per cent. Goodlass Wall were again 19s., and Cellon 5s. ordinary 24s. De La Rue were 193s. 9d., Erinoid 11s. 9d., and British Industrial Plastics 2s. ordinary 7s. There was again considerable activity in British Plaster Board, which at 38s. 9d. regained part of an earlier decline. Associated Cement became firmer at 61s., partly on talk of cement requirements for construction of prefabricated houses.

The broadening activity in textile shares raised Bradford Dyers to 25s. 6d., Fine Spinners to 26s., and Calico Printers to 19s., while Bleachers were 14s. 6d. Courtaulds showed little change at 57s. 9d., but there was more activity in some of the smaller-priced rayon shares, including North British Rayon, Kirklees, and British Enka. In other directions, Nairn & Greenwich kept firm at 77s. awaiting the results, and Barry & Staines were 51s. 9d. Greeff-Chemicals 5s. ordinary were 8s. 3d., and Monsanto Chemicals 5½ per cent. preference 23s., with Burt Boulton 24s. Results of the last-named company show the maintained 5 per cent. dividend to be conservative, as nearly 9 per cent. was earned on the shares.

Elsewhere, Boots Drug have been steady at 56s. 6d., with Sangers 29s. 3d., and Timothy Whites 40s. 9d. British Aluminium remained firm at 45s. 9d., and British Oxygen were 89s. Oil shares have been slightly easier with Shell 84s. 4½d., Burmah Oil 85s. 7½d., and Anglo-Iranian 110s.

British Chemical Prices

Market Reports

STEADY conditions have prevailed in the London general chemicals market during the past week and a moderate volume of fresh business has been reported. Prices throughout the market remain firm and the undertone is steady. Deliveries to the chief consuming industries are reported to be satisfactory. In the soda products section there is a moderate inquiry for percarbonate of soda and acetate of soda, while supplies of the hyposulphites of soda are moving steadily. Chlorate of soda is in good demand and nitrate of soda is steady. The flow of delivery specifications for Glauber salt and saltcake is reported to be steady and the market is firm. There has been no apparent improvement in the supply position of the potash chemicals, and suplies of solid caustic potash, bichromate of potash and yellow prussiate of potash are insufficient to meet current requirements. In the case of acid phosphate of potash quotations are well held and offers continue to find a ready outlet. Quiet conditions are reported in the coal-tar products market this week, with a steady trade passing in cresylic and carbolic acid. Pitch is in good request on the home market and a quiet demand is reported for the pyridines

MANCHESTER.—A feature of the Manchester chemical market has been the sustained demand for contract deliveries of the leading bread-and-butter lines, including the alkalis and the general run of textile chemicals, from using industries in Lancashire and the West Riding. Fresh inquiry on the market has been on a moderate scale and a limited amount of new business, including a little for shipment, has resulted. Among the by-products, tar oil and creosote oil are in good demand, while a fair movement of supplies of both cresylic and carbolic acids is reported. Toluol and benzol are the most active of the light distillates, interest in the xylols being less in evidence than it was a short time ago. Among the fertilisers, a steady trade is being done in basic slag and superphosphates against permits, while sulphate of ammonia is meeting with a fair demand.

GLASGOW.—In the Scottish heavy chemical trade during the past week there has been an improvement in home business. Export inquiries still remain rather limited. Prices keep very firm, with no actual changes to report.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

"LION BRAND"
METALS AND ALLOYS
MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc.
BLACKWELL'S
METALLURGICAL WORKS LTD.
GARSTON, LIVERPOOL, 19
ESTABLISHED 1869

Geigy

D.D.T.

The Basis of

New Insecticides

Uses protected by British Patents 547871 & 547874 and others applied for.

LOOK OUT

FOR FURTHER ADVERTISEMENTS

LEAD BURNING

AND

HOMOGENEOUS LEAD LINING

COILS
LUTES

VATS
CHAMBERS

and every description of

CHEMICAL LEAD WORK

H. PRATT LTD.

POTTERS LANE · ASTON

BIRMINGHAM · 6

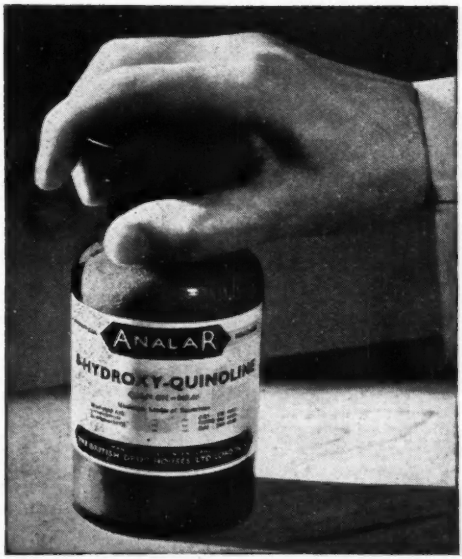
Telephone: ASTON CROSS 2141-2

Telegrams: "SANIVENTI"

'ANALAR'

'AnalaR' chemicals are essentially intended for use as standard analytical materials in laboratories where responsible work is undertaken. The approval accorded to these chemicals is an indication of the confidence with which the name 'AnalaR' is regarded in relation to reagents of precise and accepted standards.

THE BRITISH DRUG HOUSES LTD.
LONDON N.1



THE
BRITISH ASSOCIATION OF CHEMISTS
exists to organise all professional Chemists for protection of their economic interests.
ONE of its many activities is LEGAL AID.
- Advice to members on Employment Contracts.
- Assistance to members in Appeals Board cases.
- Over £2,220 recovered in salaries for members 1935-40.

For particulars of Membership, write to,—
C. B. WOODLEY, 175, Piccadilly,
C.R.A., F.C.I.S., London, W.1
General Secretary, B.A.C.

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS
Key Men in Wartime and Afterwards.

MANY of the finest posts in Britain in Wartime are reserved for Chemical Engineers. The same will be the case when the war is over. The vast technique and experience now being applied to Chemical Technology for war purposes will then be suitably utilised in reconstruction, and in trade and commerce.
Enrol with the T.I.G.B. for A.M.I.Chem.E. Examinations in which home-study Students of The T.I.G.B. have now gained :—

THREE "MACNAB" PRIZES.
including the "MacNab" Prize awarded at the last (1943) Examination.

Write to-day for "The Engineer's Guide to Success"—free, containing the world's widest choice of Engineering Courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,
219 Temple Bar House, London, E.C.4.

FOR SALE

CONSIDERABLE tonnage Nickel Catalyst residues or disposal in Manchester area. Sample on request. Metal content approx. 10 per cent. Offers to Box No. 2193, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

FOR SALE AT SOUTHAMPTON.

TWO—Totally enclosed **VACUUM MIXERS**, approx. 8 ft. 0 in. deep by 6 ft. 0 in. dia.; dished bottom; domed top; coil heated; three turns of 2 in. dia. tubing in coil situated about 18 in. up from dished bottom; square shaft glanded agitator with 7 pairs of paddles, overdriven through bevel gears by f. and l. pulleys 24 in. dia. by 6 in. face.

Two—Open top cylindrical **MIXERS**, approx. 9 ft. 0 in. deep by 9 ft. 0 in. dia.; heating by steam coil 3 ft. p.c.d. 2 in. i.d. steel tube; 3-blade propeller type agitator 3 in. square shaft, overdriven through bevel gears by f. and l. pulleys; 3 in. centre bottom outlet.

One—Horizontal **FILTER PRESS** by S. H. Johnson, Stratford, with 38 pyramid surface plates 25 in. square; centre feed can be arranged for individual discharge; ratchet screw closing gear.

Two—Horizontal **FILTER PRESSES**, plate and frame type, with 29 circular plates, ribbed surface 26 in. dia.; centre feed; hand wheel screw operated closing gear.

Cheap to avoid bringing into stock.

GEORGE COHEN, SONS & CO., LTD., WOOD LANE, LONDON, W.12

Secondhand
MIXING VESSELS.
for sale.

VERTICAL open top steam jacketed **MIXER**: jacketed portion copper lined 2 ft. 0 in. deep; top section of Mixer ¼ in. mild steel; pan fitted with stirring gear driven through gearing from f. and l. pulleys.

Vertical totally enclosed copper **MIXER**, 8 ft. 6 in. deep by 4 ft. 0 in. dia.; steam jacketed on bottom section, fitted overdriven agitating gear with f. and l. pulleys.

Horizontal unjacketed **DOUGH MIXER** by Richmond & Chandler; galvanized pan 22 in. by 22 in. by 30 in. deep, having two pairs of horizontal scythe type blades each independently driven through gearing from pulleys.

Vertical aluminium **MIXER**, 3 ft. 3 in. deep by 5 ft. 9 in. dia.; horizontal agitating shaft carrying three aluminium propellers running in glanded bearings; direct driven from pulleys; internal steam coil comprising copper coil 3 ft. 3 in. p.c.d. by 1½ in. o.d. piping; loose aluminium covers.

Vertical open top mild steel coil heated **MIXER**, 6 ft. 0 in. deep by 4 ft. 0 in. dia.; overdriven agitating gear driven through gearing from f. and l. pulleys; five turns of 1 in. mild steel tubing 3 ft. 6 in. dia.

Horizontal totally enclosed steam jacketed **MIXER**, 4 ft. 6 in. long by 2 ft. 6 in. dia.; shaft running in glanded bearing driven through gearing from pulleys; feed and discharge opening 16 in. by 14 in.; fitted with mild steel cover secured by quick-acting swing bolts; hand tilting operated in conjunction with balance weights; whole unit mounted on mild steel framework. Unit can be supplied complete with boiler if desired.

Horizontal cylindrical rotating **MIXER** by W. E. Burnell; mild steel drum 1 ft. 9 in. wide by 3 ft. 0 in. dia., driven through girth wheel and pinion from pulleys; arranged with quick release cover; whole unit mounted on cast iron stand.

Horizontal open unjacketed double trough **MIXER**, by Harrison Carter, comprising double trough cast iron mixing pan 4 ft. 0 in. by 2 ft. 2 in. by 1 ft. 4 in.; twin shafts fitted with propeller blades forming a spiral driven through gearing; 8 in by 6 in. discharge hole to each trough.

GEORGE COHEN, SONS & CO., LTD., STANNINGLEY, near LEEDS and WOOD LANE, LONDON, W.12

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

PUMP, Vertical, 3 Throw, by Bailey; 10 in. Plungers by 14 in. Stroke, geared belt drive. THOMPSON & SON, (MILLWALL), LTD., Cuba Street, Millwall, London, E.14. East 1844.

'Phone 98 Staines.

SIMON GRAIN DRYER, 8' × 2' 8"; Melville Brodie 3-Stage Jacketted Drier; Jacketted Mixing Kettle 5' 6" × 2' 8"; 30" Belt driven Hydro.

HARRY H. GARDAM & CO. LTD. STAINES.

SODIUM ACETATE in liquid form containing:—

Acetate	...	96%
Chloride	...	less than 0.05%
Impurities	...	less than 1.0%

Approximately 12 tons. Offers please, County Chemical Co., Ltd., Stratford Road, Shirley, Birmingham. SHI. 2294.

ULTRAMARINE BLUE, in bulk; Bronze Blue; Carbonate of Magnesia; Mexican Asphaltum; 5 h.p. Ver. S. Boiler, Crosstube, ins. 60 lbs.; 100 Zinc bottom trays 24 by 36; 10 gallons Castor Oil; Box No. 2191, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4

100 HYDRO EXTRACTORS by leading makers from 18 in. upwards, with Safety Covers. Jacketted Steam Copper and Iron Pans. Calorifiers-Washing Machines—Gilled Pipes, etc. List sent on request. Randalls, Engineers, Barnes. Tel.: Riv. 2436.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Willsons Springfield Mills, Preston, Lancs. Phone 2198.

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East

MONOMARK service. Permanent London address. Letters redirected. Confidential. 5s. p.a. Royal patronage. Write BM/MONO3C, W.C.1.

SITUATION VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

PLASTICS firm near London requires a senior and a junior chemist in their expanding research department. University degrees desirable. Permanent positions and excellent prospects for keen and ambitious men. Give full particulars of education, past experience and state age and salary required. Applications will be treated in the strictest confidence. Box No. 2192, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WANTED

NITRE-CAKE in 10 ton lots offers invited. Maperley & Co., Ltd., King William Street, House, Arthur Street, E.C.4.

WANTED regularly, Residues, Sludge, Slag, etc., containing Antimony, Cadmium, Copper, Lead, Nickel and Zinc. Oakland Metal Company Ltd., Willington, Derby.

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126 THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of CHEMICAL WORKS, PLANT AND MACHINERY,

York House, 12 York Street, Manchester.

Telephone: 1937 (2 lines) Central, Manchester.

WOOD & FAIRWEATHER
Successors to
RICHARD HOYLE & Co.
FOR
BLACKS
which have stood the test of time.
NEWCASTLE-UPON-TYNE
ESTABLISHED 1764

COUPON-FREE CLOTHING

OF SPECIAL INTEREST TO CHEMICAL WORKERS

EX-POLICE ALL WOOL SERGE SUITS
(Jackets and Trousers)

Tested and found impervious to Acids, etc. Grade One Garments. Thoroughly cleaned and reconditioned.

35/- per suit

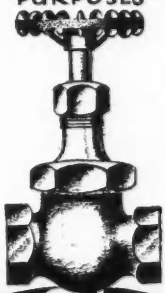
The above line has been tested in contact with all the well-known Acids and Alkalis, and has shown highly resistant qualities in all cases.

SAMPLE FORWARDED ON REQUEST.

Terms: Nett m/a. Carriage paid on orders over £10. Delivery: ex Stock.

WILLSON BROTHERS
EPSOM SURREY Phone: Epsom 1293

STEAM & WATER FITTINGS FOR ALL PURPOSES



TRIONITE VALVES

ENSURE THE MAXIMUM OF EFFICIENCY TOGETHER WITH LONG LIFE UNDER ALL WORKING CONDITIONS

Also SAND CASTINGS IN ALL NON-FERROUS METALS INCLUDING HIGH TENSILE BRONZES & ALUMINIUM

Trionite Ltd., Cliffe Vale, Stoke-on-Trent

PHONE: STOKE-ON-TRENT 2171-2

TANKS, PANS, TOWERS, PUMPS, ETC.

Built in Tantiron, Lead, Keebush and non-ferrous metals.

Lennox **Foundry Co. Ltd.**

Glenville Grove, London, S.E.8

Specialists in corrosion problems

"ZULO"

CARBOY HAMPERS

LEIGH & SONS METAL WORKS
Orlando St.
BOLTON.

NITRALLOY STEELS

Nitrogen case hardened by the NITRALLOY patent process, SURFACE HARDNESS 1050-1150 Brinell—"the hardest Metal Surface known to man." *Write now for full particulars.*

NITRALLOY LTD.
25, TAPTONVILLE RD., SHEFFIELD, 10.
Phone: 60689, Grams: Nitralloy, Sheffield

Specialists in
Carboys, Demijohns, Winchesters
JOHN KILNER & SONS (1927) LTD.
Tel. WAKEFIELD 2042 *Established 1867*

TRIBASIC PHOSPHATE OF SODA
Free Running White Powder
Price and sample on application to :
PERRY & HOPE, LIMITED, Nitshill, Glasgow

DISCOVERY

keeps you informed on everyday science with popular articles and news by leading authorities

1/6 MONTHLY
19/- annual subscription

EMPIRE PRESS
NORWICH

CHEMICAL LEADWORK
TANKS — VATS — COILS — PIPEWORK
W. G. JENKINSON, Ltd. Telephone 22473
156-160, ARUNDEL STREET, SHEFFIELD

GROUND BONE, FELSPAR, FLINT, FLUORSPAR, QUARTZ, STONE, WHITING, Etc.
OXIDES OF ANTIMONY, ARSENIC, CHROME, COBALT, SMALTS, COPPER, IRON, MANGANESE, NICKEL, TIN, TITANIUM, URANIUM, ZINC, Etc.
CARBONATE & SULPHATE OF BARYTES
WENGERS LTD.
CERAMIC COLOURS & CHEMICALS
ETRURIA,
STOKE-ON-TRENT,
England
COLOURS for POTTERS, GLAZE & BRICK MANUFACTURERS & GLASSMAKERS
PREPARED ENAMELS for CAST & SHEET IRON, COPPER & JEWELLERY

SWIFT & COMPANY PTY. LTD.

Specialising in

INDUSTRIAL CHEMICALS, SOLVENTS, PLASTICS, AND MATERIALS FOR MANUFACTURING INDUSTRIES THROUGHOUT AUSTRALIA AND NEW ZEALAND.

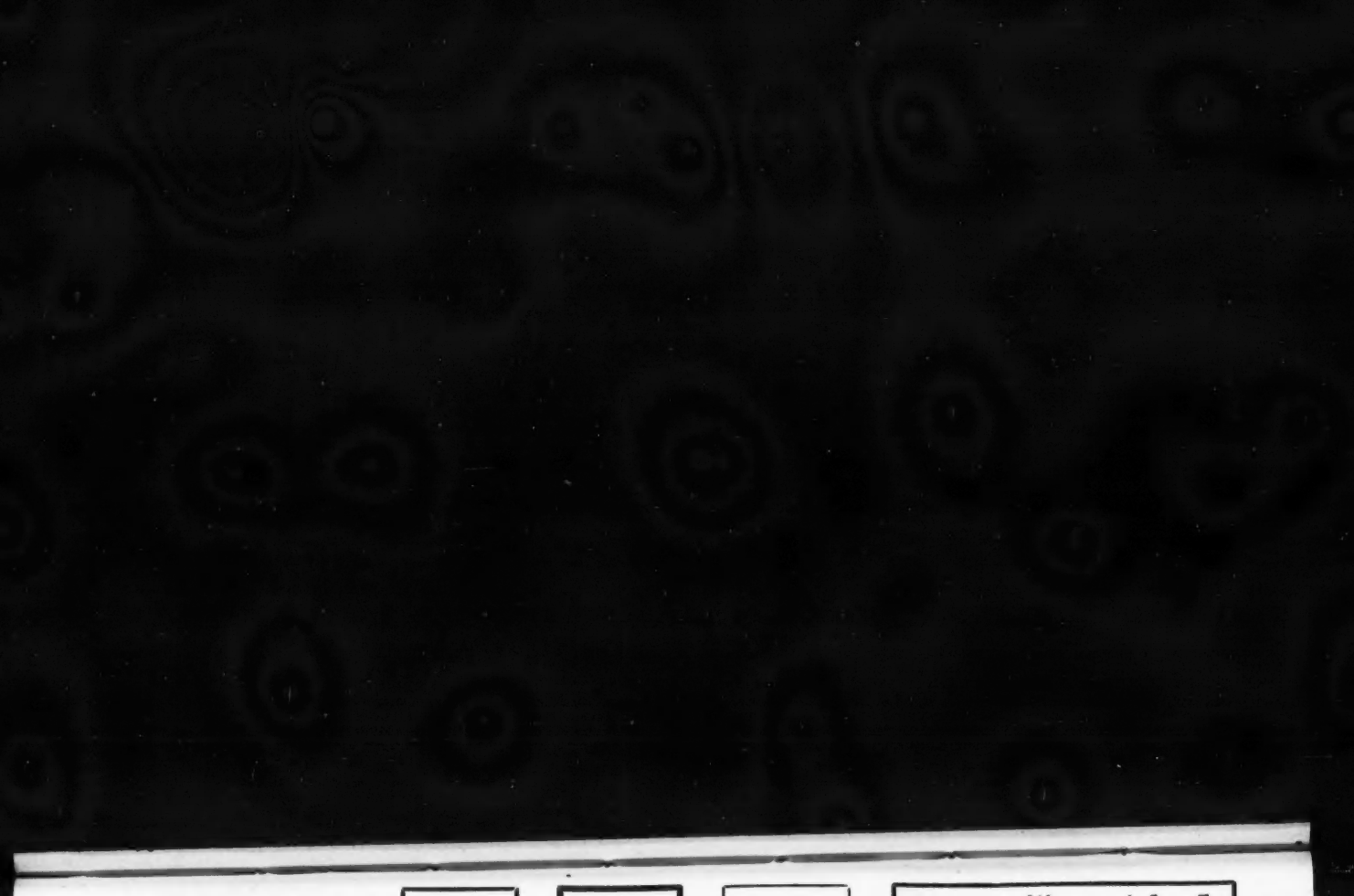
Open to extend connections with

BRITISH MANUFACTURERS

Head Office: 26/30, Clarence Street, Sydney, N.S.W. and at
Melbourne, Adelaide, Perth, Brisbane and Wellington N.Z.

Cable Address: SWIFT, SYDNEY

Bankers: Bank of New South Wales, Sydney and London.



Manufacturers of

LIQUID FILLING MACHINES
FOR BARRELS, CANS AND DRUMS
BARREL WASHING MACHINES
SAFETY ELECTRIC HAND LAMPS AND TORCHES
BARREL & CAN INSPECTION TORCHES
VACUUM & PRESSURE RELIEF VALVES
FOR SPIRIT STORAGE TANKS

Send for illustrated lists

DOWNS ENGINEERING WORKS
LIMITED
SOUTHFIELD ROAD · ACTON
LONDON, W.4.

FOUR OAKS SPRAYING MACHINES
for FACTORY LIMEWASHING

The "FOUR OAKS" way of quick and easy Limewashing, Colourwashing, Distempering and Disinfecting.

BRIDGEWATER PATTERN SPRAYING MACHINE is made in two sizes, 18 galls. and 30 galls.

Catalogues free

All Prices are subject to conditions prevailing at the time Orders are received.

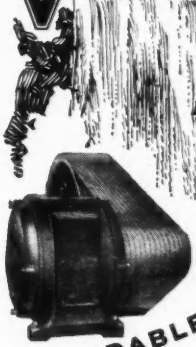
Sole Manufacturers:
The Four Oaks Spraying Machine Co.
Four Oaks Works, Four Oaks, BIRMINGHAM
W. C. G. LUDFORD, Proprietor.
Telegrams: "Sprayers, Four Oaks." *Telephone:* 305 Four Oaks.

PURE DISTILLED
FATTY ACIDS
OF EVERY DESCRIPTION

Drying, Half-Drying and Non-Drying

VICTOR WOLF
LTD.
Victoria Works, Croft Street
Clayton, MANCHESTER, 11
Telephone EAST 1082-3
Telegrams GLYCERINE Manchester

CROFTS *Sure-Grip*
V ROPE DRIVES
for



DEPENDABLE POWER
UNFAILING ENERGY
ALWAYS AVAILABLE
EVERY DRIVE GUARANTEED

CROFT'S "V" ROPE DRIVES are acknowledged the most practical, convenient, reliable and efficient method of driving all classes of machinery.

STOCK DRIVES available from fractional horse power upwards in all ratios up to 9—1.

Ask for copy of CROFT'S-STOCK "V" ROPE DRIVE catalogue S.G. 136. Finger Tip Selection of correct drive for any power.

CROFTS (ENGINEERS) LIMITED
THORNBURY BRADFORD ENGLAND

DESIGN and ERECTION
OF
CHEMICAL PLANTS
AND
EQUIPMENT

CYANAMID PRODUCTS LTD

NITROGENOUS
FERTILISERS

SYNTHETIC AMMONIA

NITRIC and SULPHURIC ACIDS

ACID RECOVERY from REFINERY SLUDGE

BERKHAMSTED, HERTS.

THE PASCALL PATENT

Screen Sifting Machine

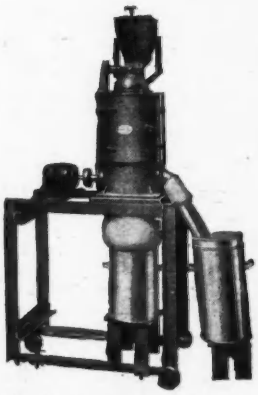
Used THROUGHOUT the Chemical Industry, the Pascall Screen Sifter operates on the up-to-date principle of Turbine flotation, and deals successfully with :—

Chemicals
Dyestuffs
Dry Colours
Distempers
Synthetic Resins
Face Powders

Our London Test Station is always available for our prospective customers to try out their materials on our machines.

We also invite our friends to avail themselves of the services of our " Technical Department " which advises on all Grinding, Sifting and Mixing Problems.

WRITE FOR LIST M669 TO :



Portable Motorised Unit No. 0 size.

THE PASCALL ENGINEERING CO., LTD.
Manufacturers of Grinding, Sifting, and Mixing Machines
114 LISSON GROVE, LONDON, N.W.1
Telephone : PADdington 7236-7237 *Telegrams : " Pasenco, Phone, London "*

Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, December 16th, 1944. Entered as Second Class Matter at the New York, U.S.A., Post Office.